US Army Corps of Engineers
Buffalo District

Western Lake Erie Basin (WLEB)
Blanchard River Watershed Study
Section 441 of the Water Resource Development Act of 1999
General Investigations

Draft Mitigation and Monitoring Plan

U.S. Army Corps of Engineers, Buffalo District

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1.0 Introduction

This document describes the draft mitigation and monitoring plan (MMP) to compensate for adverse and unavoidable impacts to wetlands and streams anticipated with implementation of the Tentatively Selected Plan (TSP) for the Blanchard River Watershed Feasibility Study (feasibility study). This document summarizes the feasibility study and outlines the proposed mitigation, including the location and nature of the mitigation, planning constraints (e.g., lack of site access), site selection, policy compliance, and applicable performance criteria and long-term management.

1.1 Study Area

The Blanchard River Watershed, a sub-basin of the Western Lake Erie Basin, is located in northwestern Ohio. The study area consists of the watershed boundaries of the Blanchard River within Putnam, Hancock, Seneca, Allen, Harden and Wyandot Counties (see Figure 1.1). The creeks and rivers which comprise the Blanchard River Watershed drain directly to the Auglaize River and eventually flow to the Maumee River before emptying into Lake Erie.

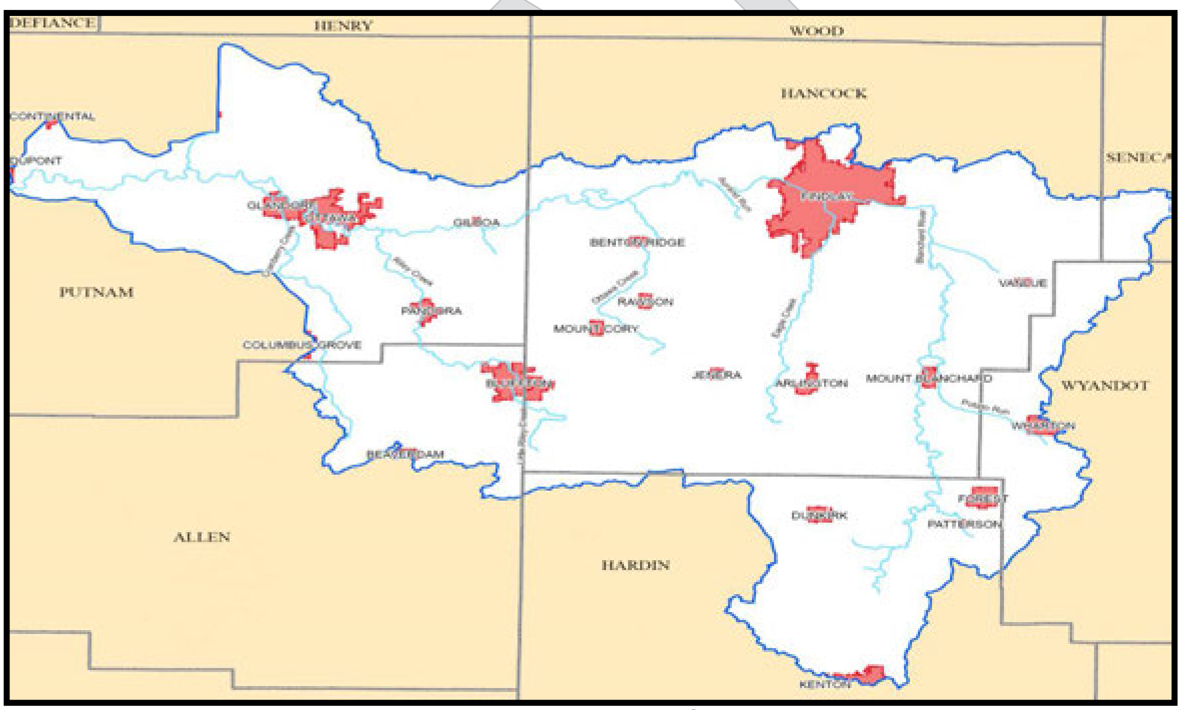

Figure 1.1: Watershed Map of Blanchard River

1.2 Study Focus

The feasibility study is focused on reducing flood risk in the vicinity of the city of Findlay (population 41,202) (Figure 1.2). Findlay and its surrounding area has received substantial flood damages from overbank flooding of the Blanchard River and its tributaries over the past decade. Findlay is the county seat for Hancock County and is an important regional business center. It is headquarters to several major corporations, including Marathon Petroleum and Cooper Tire, both Fortune 500 Corporations.

The Blanchard River Watershed is characterized by alluvial flatlands that are prone to flooding, resulting in repeated flood damages largely in Findlay. This repetitive flooding, which has increased in frequency and intensity in recent years, prompted the Western Lake Erie Study authorization in 1999. The Blanchard River has reached or exceeded major flood stage 25 times since 1913. Of these, ten flood events have occurred since 1990. For events between 1990 and the present, five are among the top ten stages ever recorded; three have peaked at more than three feet over major flood stage, and one event in August 2007 reached a peak stage of only 0.04 feet less than the maximum recorded peak of 18.5 feet in 1913. Damages during the 2007 flood event exceeded $60 million in the Findlay area and $20 million in the village of Ottawa area downstream of Findlay, as estimated by the Northwest Ohio Flood Mitigation Partnership.

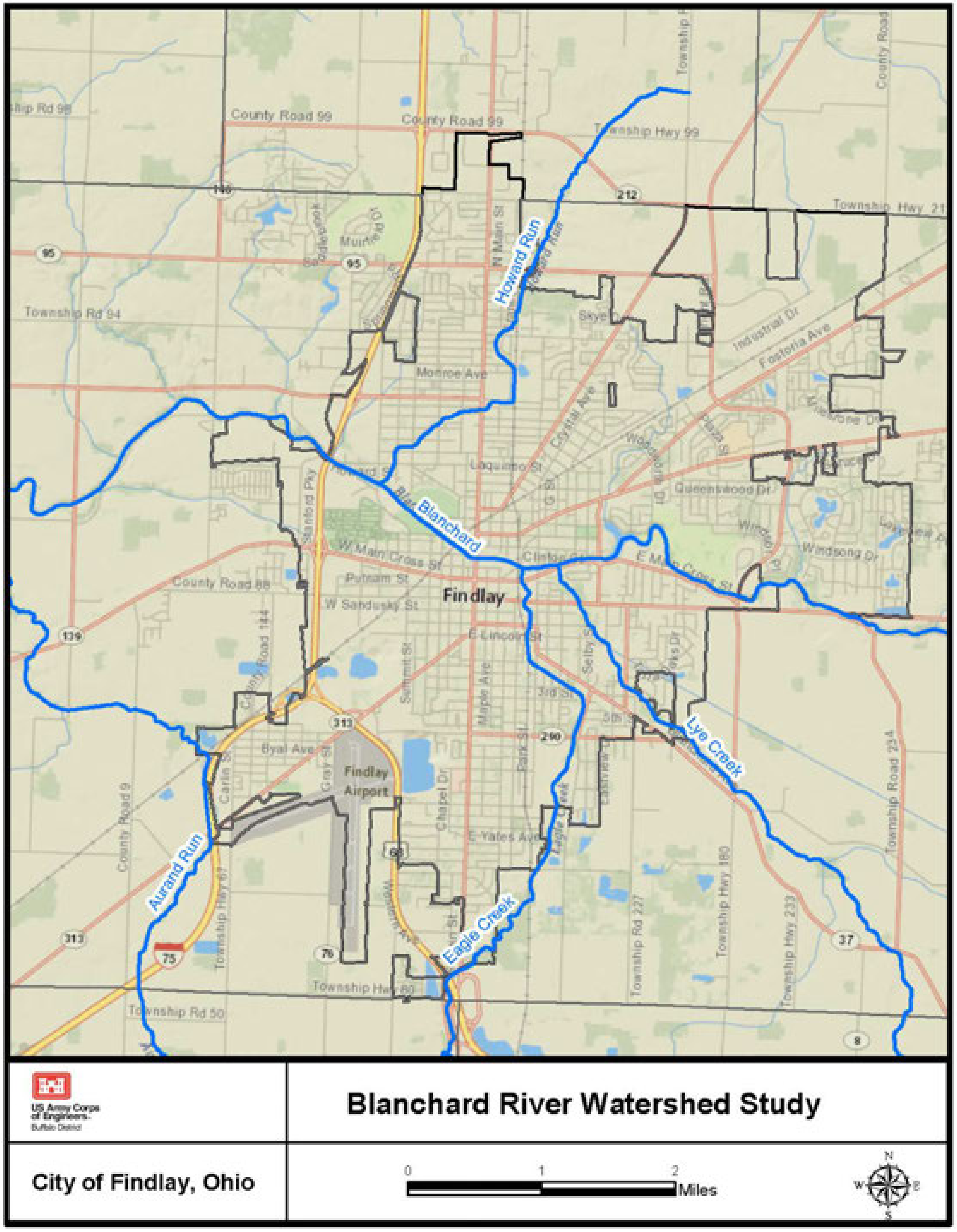

Figure 1.2: Map of Findlay, OH area

1.3 Tentatively Selected Plan

The components of the TSP from the feasibility study include the following features: a diversion channel to capture flows from Eagle Creek above a two year storm event and move it downstream of the city of Findlay, and a containment levee along the Blanchard River just south of the city drinking water reservoir that will limit the amount of overland flow of the Blanchard River toward Lye Creek. Figure 1.3 provides an overview of the components which make up the TSP.

The diversion channel will extend approximately 9.4 miles and will consist of a trapezoidal channel which has a bottom width of 35 to 47 feet and is approximately 10 to 16 feet deep. This has been designed to maximize the drainage area controlled by the diversion channel. The alignment of the diversion channel was established based on a careful review of existing HTRW information, soil survey data, rock maps and aerial photographs, desktop determination of existing freshwater wetlands and streams, and property information to minimize property and structure impacts. Future minor changes to the alignment are anticipated as the exact locations of abandoned oil wells are determined, on-site wetland and stream delineations are performed, further analysis of bridge approaches based on structural and hydraulic analysis, and consideration of public and agency comments during review of the draft feasibility study.

The Blanchard to Lye cutoff levee would prevent flood waters from moving overland from the Blanchard River upstream of Findlay toward Lye Creek, thus protecting low-lying areas on the downstream end of Lye Creek. Minor changes to the alignment of this levee are also possible for the same reason as stated above for the diversion channel.

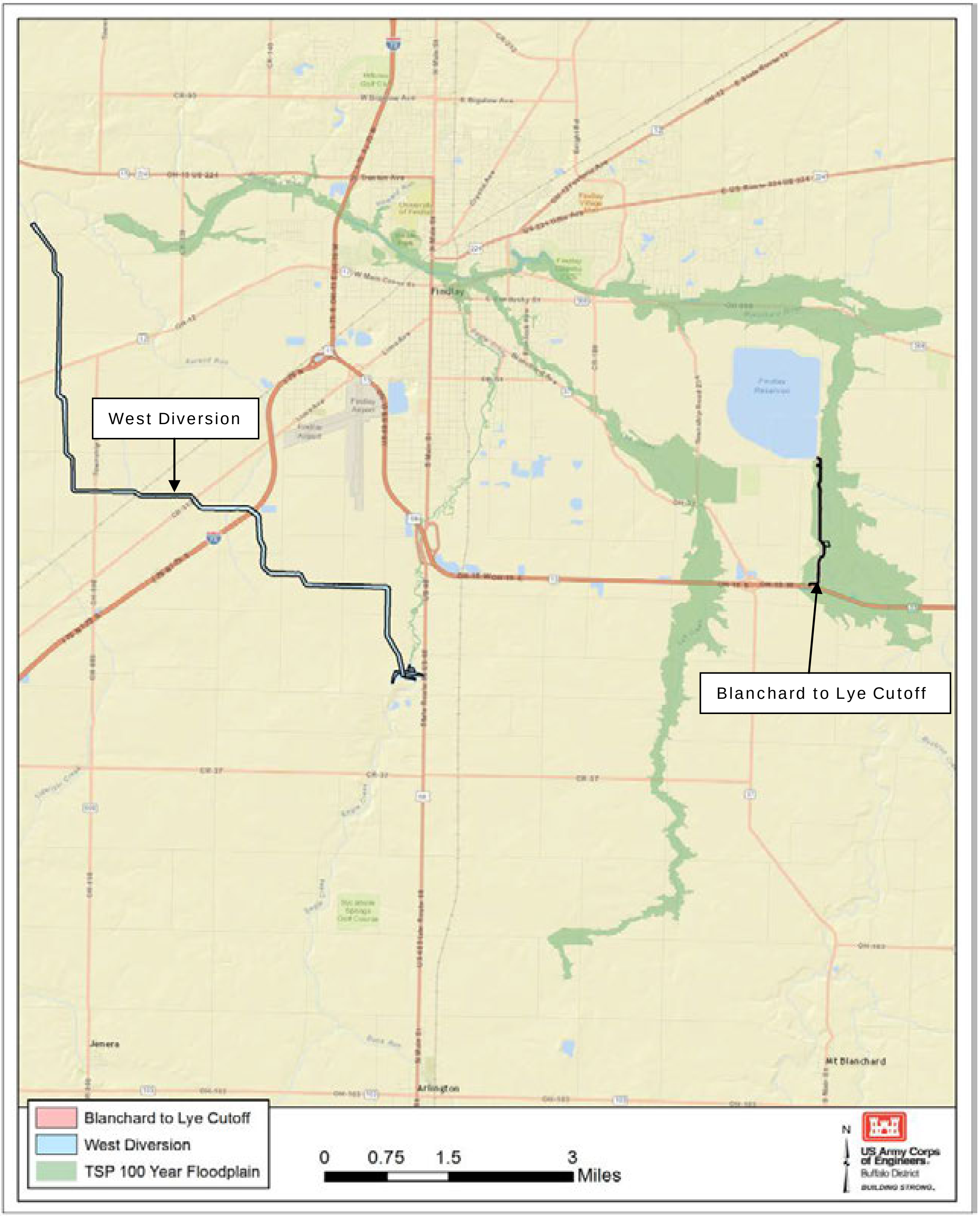

Figure 1.3: Overview of the Tentatively Selected Plan.

1.4 Avoidance and Minimization

Through early coordination with applicable state and federal resource agencies throughout the USACE Planning Process, a large amount of wetland and stream impacts have been avoided and minimized prior to identification of the TSP. Environmental impacts were a factor in screening out various measures considered during the Planning Process. Significant stream and wetland impacts were avoided with the screening out of widening and deepening the Blanchard River and Eagle Creek as well as through elimination of the Aurand Run diversion channel alignment. Additional wetland impacts were avoided earlier in the study by eliminating the option for an eastern diversion channel which would have impacted very high quality forested wetlands between Eagle Creek and Lye Creek on the southeast side of Findlay. Additionally, BMPs will be incorporated to the extent practicable to minimize adverse impacts. These would include, but not necessarily be limited to, conducting in-water work only during low flows to minimize sedimentation as well as the development and implementation of a storm water pollution prevention plan. There are still approximately 11.6 acres of unavoidable impacts to freshwater wetlands and 5,507 linear feet of streams that are expected during implementation of the TSP (direct and indirect impacts combined). Refer to Appendix E of the feasibility study for additional details through the Clean Water Act Section 404(b)(1) evaluation.

1.5 Mitigation Planning Constraints

Site specific wetland and stream data was not used to assess the existing conditions or anticipated impacts within the study area because of a lack of site access to both the anticipated impact areas and mitigation areas. Several attempts to gain site access to collect this information were made through USACE Real Estate and the non-federal sponsor, but only 24 of a total of 231 property owners have responded to date. Therefore, a desktop review of readily available resources (i.e., aerial photos, soil survey, Ohio & National Wetland Inventory mapping, National Hydrography Dataset, land use mapping, and discussion with resource agencies) was completed to identify as accurately as possible any wetland resources that may be impacted.

1.6 Wetland and Stream Impacts

1.6.1 Wetlands

In order to make a comprehensive database of wetlands in the area, a hybrid of both the National Wetland Inventory (NWI) and Ohio Wetland Inventory (OWI) coverages was created using a Geographic Information System (GIS). The datasets were merged in a way to prevent the over calculation of resources and to encompass all available data. Table 1.1 provides the estimated type and associated acreage of wetland impacts expected to occur as a result of implementation of the TSP. The TSP was found to therefore likely result in unavoidable impacts to 0.34 acre of emergent wetlands, 0.65 acre of scrub-shrub wetlands, and 10.6 acres of forested freshwater wetlands. These impact calculations assume that all wooded areas with hydric soils are wetlands, since they would otherwise likely be in active agricultural production given the surrounding land use in the area. This assumption is expected to result in an overestimation (conservative value) of wetland impacts based on previous work conducted in adjacent areas where direct access was available and which revealed that such forested areas on hydric soils are not always wetland. If site access is obtained in the future and field surveys are conducted, it is therefore expected that the total amount of wetlands currently assumed to be within the project area will go down along with the expected impacts.

It is currently expected that the in-stream diversion structure on Eagle Creek will temporarily back up water in Eagle Creek following flow events somewhere in excess of a two year storm event. This may result in a conversion of existing adjacent forested wetlands upstream over a long period of time to either scrub-shrub or emergent wetland communities. During this same period of time, however, it is possible that new wetland areas may be created or existing wetlands enhanced within the flood zone due to the periodic increased hydrology. A very conservative estimate of wetland impacts is currently assumed during feasibility which considers all wetlands that fall within the 100-year ponding area to be indirectly impacted. This is a conscious overestimation of impacts. As more detailed design and modeling analysis of this structure is conducted, a more refined estimate of ponding frequency and duration will be available to determine the likely extent of impacts. It is also expected that any increase in flooding frequency and duration in this upstream area will increase the amount of forested riparian wetlands adjacent to the current forested wetlands. The impact to the existing forested wetlands would be in the form of a change in cover type (e.g., scrub-shrub or emergent hydrophytic vegetation). Thus the area upstream of the diversion structure will therefore result in no net loss or possibly a net increase in riparian wetlands upstream of the diversion structure.

Table 1.1. Unavoidable Impacts to wetlands from Recommended Plan (NWI and OWI)

Wetland Type	Impact	Area in Acres
Emergent	Direct	0.00
Emergent	Indirect	0.34
Scrub-Shrub	Direct	0.00
Scrub-Shrub	Indirect	0.65
Forested	Direct	7.09
Forested	Indirect	3.51

1.6.2 Streams

Table 1.2 outlines the anticipated linear feet of stream impacts from the diversion channel along with the associated stream types based on the National Hydrography Dataset (NHD), aerial interpretation, and observations from road crossings are presented in Table 1.2. The largest of these impacts occurs on Eagle Creek where the inlet of the diversion channel would be constructed to capture flows above the two year storm event. Impacts on the Blanchard River would occur from the outlet of this diversion channel and associated bank armoring. The other stream impacts are to smaller streams which would be crossed by the diversion channel. Where the diversion channel intersects Aurand Run, an aquaduct or inlet would be constructed to prevent the dewatering of downstream areas of Aurand Run. It is anticipated that downstream dewatering of the other streams would not occur due to their more ephemeral nature and their receipt of agricultural tile drainage.

Table 1.2. Stream impacts associated with the Alternative 2 Alignment (NHD, 2014 & aerial interpretation)		
Stream Name	**Type**	**Impact Length (LF)**
Western Alignment – Ephemeral Stream 2	Ephemeral	307.11
Western Alignment – Intermittent Stream 5	Intermittent	1,294.91
Western Alignment – Perennial Stream 3	Perennial	657.78
Aurand Run	Perennial	653.27
Blanchard River	Perennial	250.70
Eagle Creek	Perennial	2343.38
Totals	Ephemeral	307.11
	Intermittent	1,294.91
	Perennial	3,905.12
	Overall	5,507.14

2.0 Mitigation Planning

2.1 Guidance

The USACE Planning Guidance Notebook (ER 1105-2-100) describes the mitigation process, procedures and content of mitigation plans to be included in feasibility level reports. The planning of USACE projects must ensure that project related adverse environmental impacts (i.e., impacts on fish and wildlife resources) have been avoided or minimized to the extent practicable, and that remaining unavoidable significant adverse impacts are compensated to the extent justified. Under Section 2036(a)(3)(B) of WRDA 2007, Public Law No. 110-114, Section 2036(a)(3)(B), 121 Stat. 1093 (2007), USACE must fully develop a mitigation plan that includes the following: (1) monitoring until successful, (2) criteria for determining ecological success, (3) a description of available lands for mitigation and the basis for the determination of availability, (4) the development of contingency plans (i.e., adaptive management), (5) identification of the entity responsible for monitoring, and (6) establishing a consultation process with appropriate federal and state agencies in determining the success of mitigation.

ER 1105-2-100 requires that mitigation plans be analyzed for cost effectiveness and incremental cost and benefits. Analysis of cost effectiveness, in general, compares the relative costs and benefits of alternative mitigation plans. The least expensive plan which meets the restoration objective is usually selected. “Incremental Cost Analysis” is the technique used by USACE to develop cost effective mitigation plans. Incremental cost analysis calculates the cost per unit of output gained by each successive feature, allowing the planning team to determine the point of diminishing returns. This mitigation plan does not currently include a Draft Cost Effectiveness Incremental Cost Analysis Report due to a lack of site access which has prevented the collection of baseline information necessary to conduct this analysis (reference Section 1.5 of this report). This analysis will be completed at a future date pending access to the likely impact and mitigation areas. In the meantime and for purposes of completing feasibility, estimated compensatory stream and wetland mitigation ratios and costs have been used in the Planning Process. For wetland impacts, a ratio of approximately 2:1 (acres) has been used and for stream impacts a ratio of approximately1.5:1 (linear feet) has been used. Estimated costs for each, based on Mitigation Banks in the area and consultation with USACE Regulatory, are $25,000 per acre for wetland mitigation and $100 per linear foot for stream mitigation. These costs, based on current conservative impact estimates, have been incorporated into overall project cost estimates and do factor into the overall Benefit Cost Ratios used to select the TSP. These estimated ratios have also been coordinated with state and federal natural resource and regulatory agencies in the state of Ohio.

2.2 Site Selection

Mitigation banks and in-lieu fee mitigation programs were investigated that cover the Blanchard River Watershed as potential compensatory mitigation options for the proposed unavoidable impacts to wetlands and streams by the TSP. At this time, the White Star Expansion Area, which is operated by the North Coast Regional Council of Park Districts, 12882 Diagonal Road, LaGrange, OH 44050 is the only wetland mitigation bank that has a service area that covers the Blanchard River Watershed, however, it only has 16 credits of forested wetlands available and thus is insufficient to compensate for the proposed wetland impacts. The Nature Conservancy has an approved in lieu fee program for both wetlands and streams in Ohio. There are currently 10,000 LF of stream credits available and 20 credits of wetland mitigation available within the Blanchard River Watershed. The wetland credits are insufficient to offset the proposed wetland impacts and the stream mitigation credits are $390 per linear foot which is considerably more than the estimate assumed for permittee responsible stream mitigation ($100 per linear foot). This coupled with discussions with the U.S. Fish and Wildlife Service (USFWS), the Ohio Environmental Protection Agency (OEPA), and the Ohio Department of Natural Resources (ODNR), it was proposed that on-site mitigation, or off-site mitigation in close proximity to the proposed impacts, would be a preferred method to compensate for the unavoidable wetland and stream impacts. Figure 2.1 shows the preliminary locations of the proposed mitigation areas based on the selection criteria described below in Sections 2.2.1 and 2.2.2.

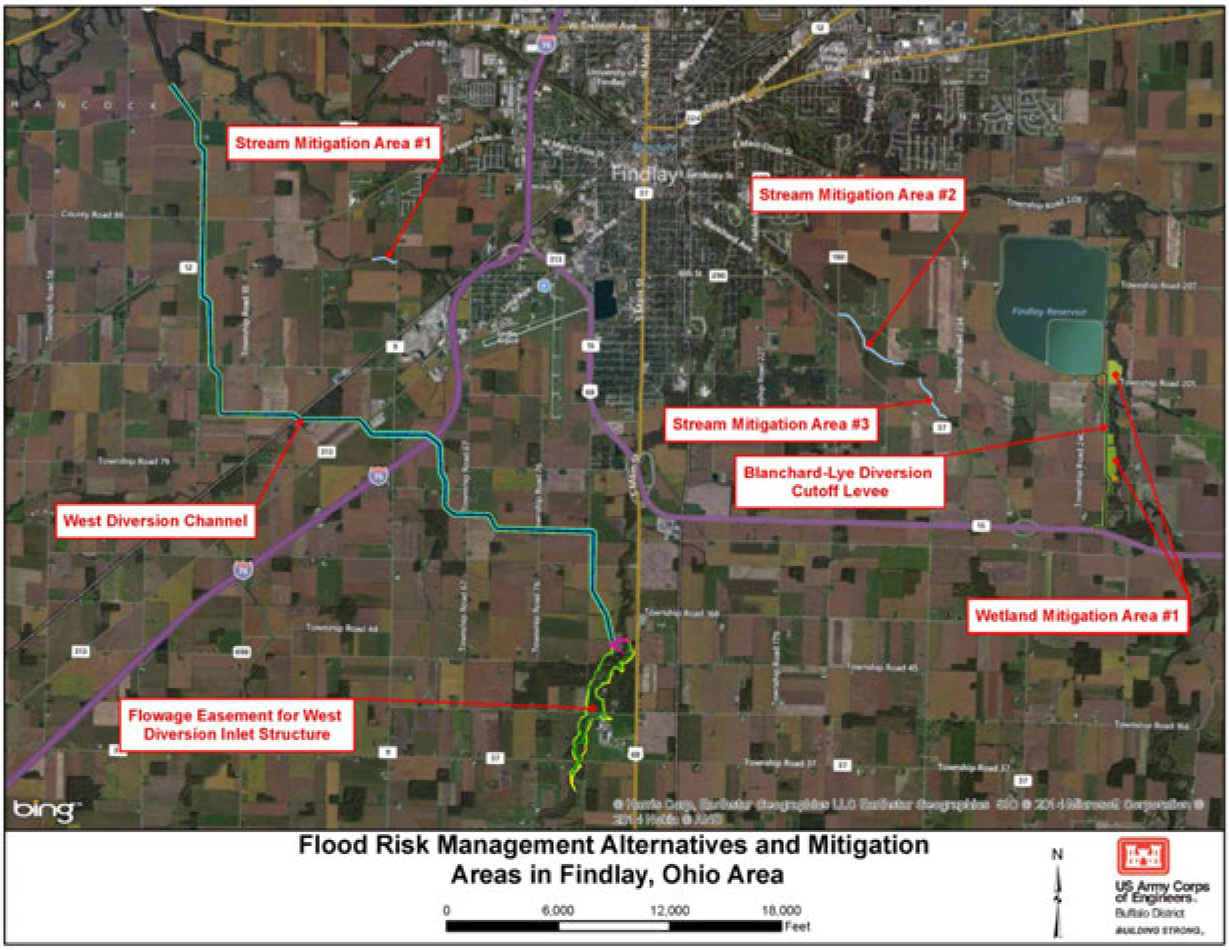

Figure 2.1: Recommended Plan with proposed mitigation areas in Findlay, Ohio.

2.2.1 Wetlands

Areas within the potential real estate footprint that would be required for the flood risk management project were prioritized and investigated for their suitability to perform compensatory wetland mitigation. In addition, areas were sought which do not currently possess wetlands, that are in close proximity to tributaries, and that lack a scrub-shrub or forested cover type. There were three small areas identified directly adjacent to the Blanchard to Lye Cutoff Levee which exhibited these characteristics and together totaled approximately 45 acres (Figure 2.2). Additional avoidance and minimization through modification of the west diversion and cutoff levee alignment reduced the total wetland impacts for the TSP to less than 12 acres. Thus, approximately 24 acres of lands are required for compensatory mitigation (2:1 mitigation ratio). Two of these areas originally identified adjacent to the Blanchard to Lye Cutoff Levee total approximately 24 acres and were carried forward as potential wetland mitigation areas (Figure 2.3).

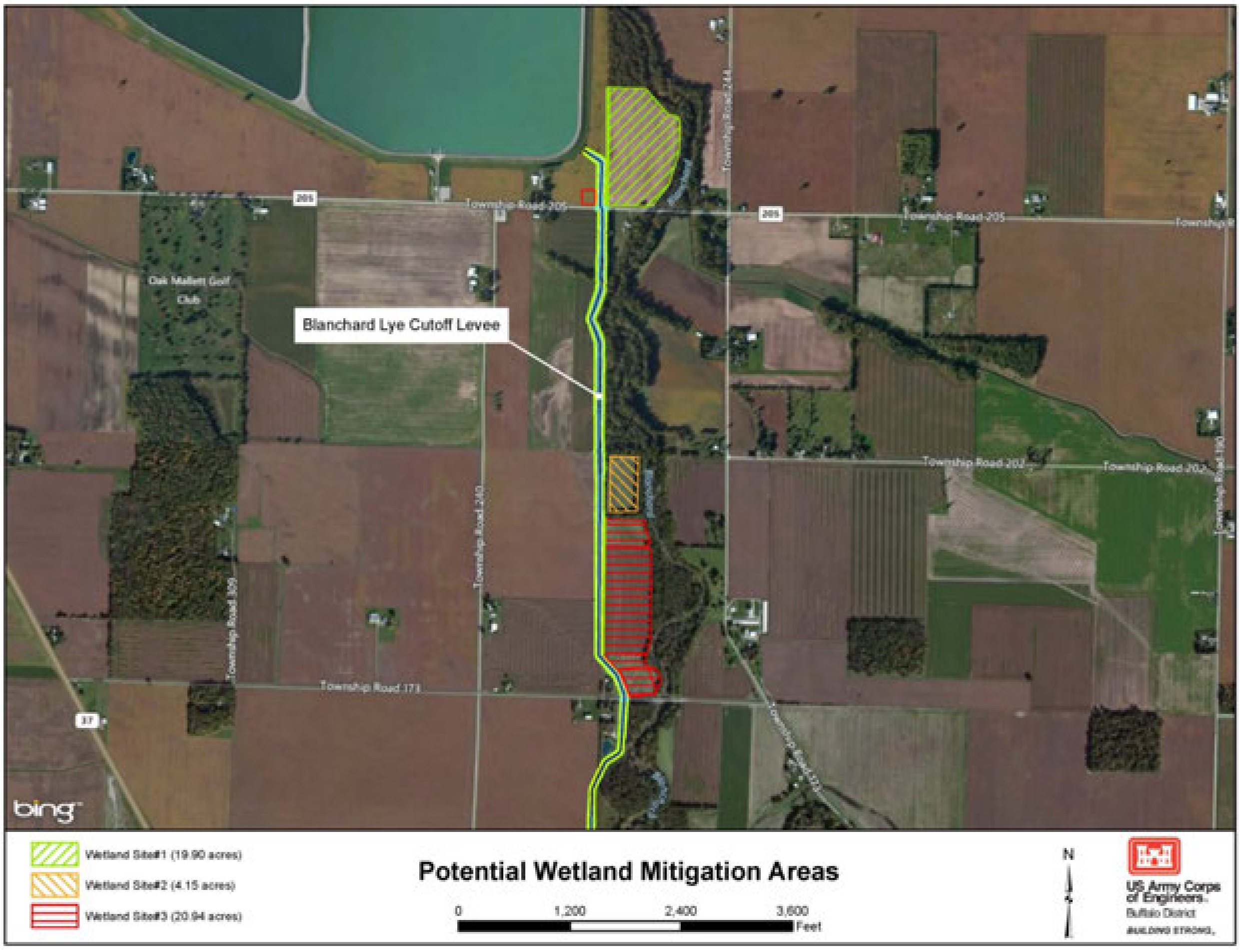

Figure 2.2: Wetland mitigation areas adjacent to Blanchard to Lye Cutoff Levee (Total = approx. 45 acres)

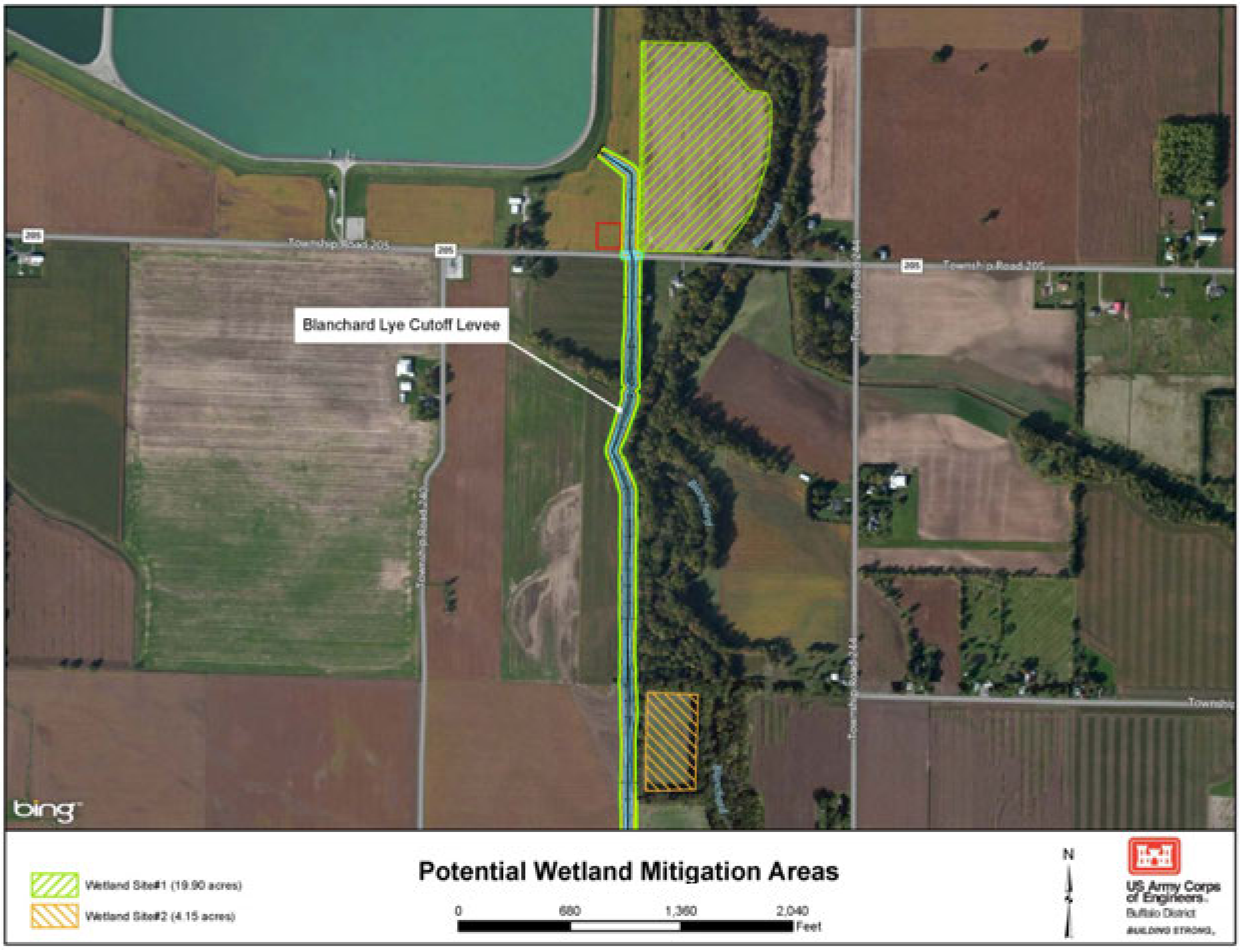

Figure 2.3: Wetland Mitigation Areas adjacent to Blanchard to Lye Diversion Cutoff Levee (Total = approx. 24 acres)

2.2.2 Streams

No areas were available within the potential real estate footprint that would be required for the flood risk management project that would enable stream mitigation (e.g., restoration or enhancement). Therefore, areas that were in close proximity to the flood risk management project within the Aurand Run and Lye Creek watersheds were investigated. Perennial stream channels that were devoid of a forested or scrub shrub riparian corridor and that have been heavily modified or deeply incised such that they no longer were in contact with their floodplain were prioritized. Given the heavily fragmented landscape, it was determined that stream sections which connected woodlots would also be very important for improvement for both aquatic and terrestrial wildlife. Three potential areas were identified which total approximately 9,100 linear feet of stream. Stream Mitigation Area #1 is located on Aurand Run and is approximately 1,500 linear feet (Figure 2.4). Stream Mitigation Area #2 is location on Lye Creek and is approximately 4,900 linear feet (Figure 2.5). Stream Mitigation Area #3 is located just upstream of Stream Mitigation Area # 2 on Lye Creek (Figure 2.6).

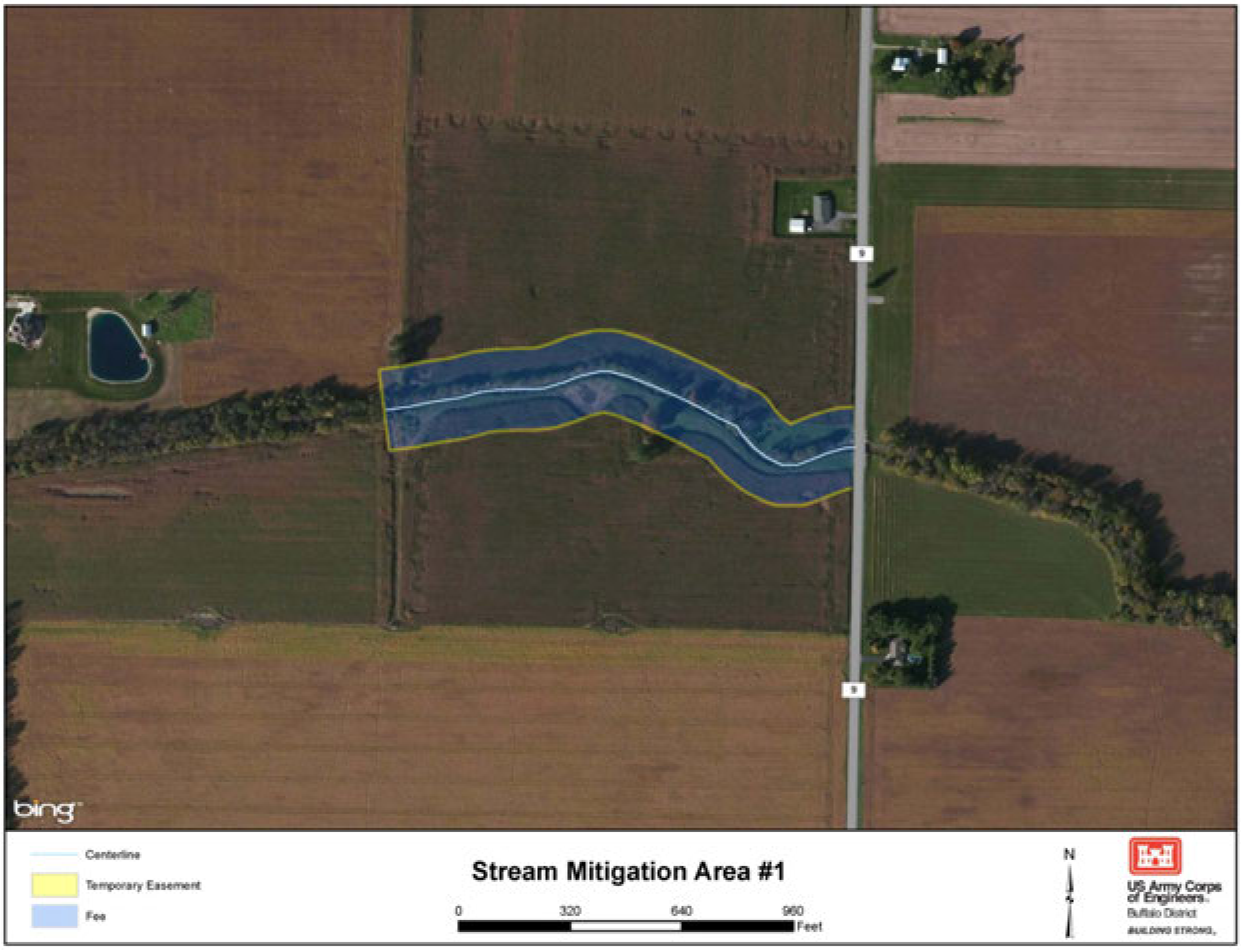

Figure 2.4: Stream Mitigation Area #1 (approximately 1,450 linear feet)

Figure 2.5: Stream Mitigation Area #2 (approximately 4,900 linear feet)

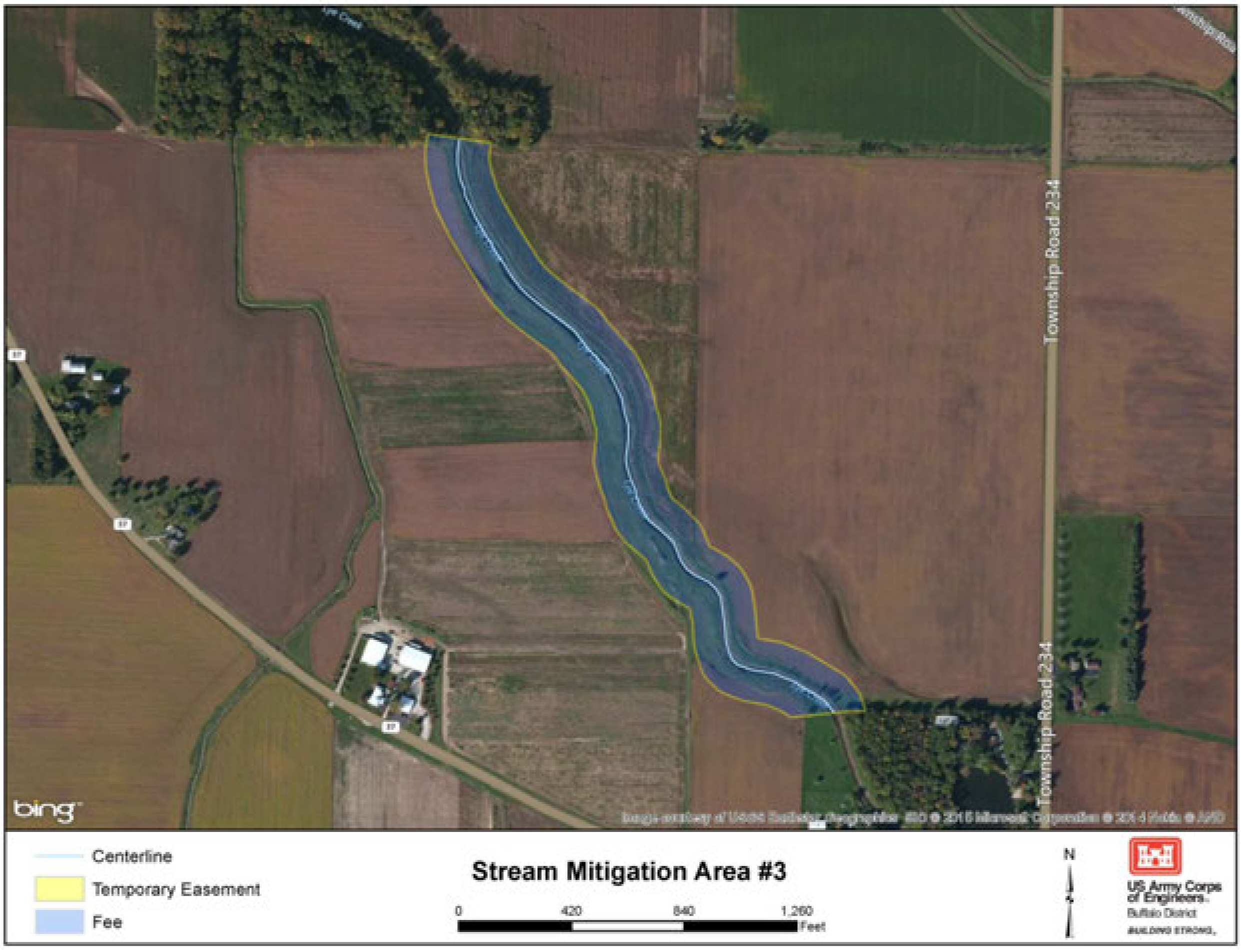

Figure 2.6: Stream Mitigation Area #3 (approximately 2,750 linear feet)

2.3 Functional Assessments

Although site access has not enabled USACE to perform on-site evaluations to delineate wetlands, streams, or perform functional assessments, it is planned that these analyses will be performed once site access is granted. However, it is possible that this may not occur until after completion of the feasibility study or during the preconstruction, engineering, and design phase. It is planned that the Habitat Evaluation Procedures (HEP) will be used during this time, which is a habitat based approach for assessing environmental impacts of proposed water and land resource development projects (USFWS 1980). The method can be used to document the quality and quantity of available habitat for selected fish and wildlife species. Habitat Suitability Indices (HSI's) will be calculated for representative species of birds that are likely to use the emergent, scrub-shrub, or forested riparian wetland areas or stream areas that are being investigated as part of the mitigation planning. These species include the yellow warbler (scrub-shrub) and downy woodpecker (forested) (Schroeder 1982a; Schroeder 1982b). The HSI's will be coupled with the Ohio Rapid Assessment Method for Wetlands (ORAM) to evaluate the function and quality of wetlands being impacted as well as to eventually assess wetland mitigation success (Mack 2001) (Table 2.1). The ORAM is a rapid assessment method developed by OEPA to distinguish between three different categories of wetland that relate to their level of function and quality. These three broad categories of wetlands include:

Category 1 wetlands - low quality wetlands that support minimal wildlife habitat, and minimal hydrological and recreational functions and do not provide critical habitat for threatened and endangered species or contain rare, threatened or endangered species;

Category 2 wetlands - medium quality wetlands that support moderate wildlife habitat, or hydrological or recreational functions and are dominated by native species but generally without the presence of, or habitat for, rare, threatened or endangered species. Category 2 wetlands also include a sub category of wetlands that are degraded but have a reasonable potential for reestablishing lost wetland functions;

Category 3 wetlands are high quality wetlands that have superior habitat, or superior hydrological or recreational functions. They are typified by high levels of diversity, a high proportion of native species, and/or high functional values. Category 3 wetlands include wetlands which contain or provide habitat for threatened or endangered species, are high quality mature forested wetlands, vernal pools, bogs, fens, or which are scarce regionally and/or statewide.

Table 2.1. Functional Assessments proposed to evaluate impacts and mitigation habitat units for wetlands

Habitat Type	**ORAM**	**Yellow Warbler HSI**	**Downy Woodpecker HSI**
Emergent Wetland	X		
Scrub-Shrub	X	X	
Forested Wetland	X		X
Forested Buffer			X

The ORAM scores will be determined for the existing and predicted future conditions for each of the habitat types except Forested Buffer. To adhere to the HEP framework, the ORAM scores will be standardized to a scale between zero and one by dividing by 100. The standardized ORAM scores will then be combined with the HSI value for that particular habitat type and then multiplied by the acres of habitat type to determine the habitat units (*HU*) of the existing and future conditions. The following equations will be used to calculate existing and future habitat units for a particular habitat type:

Equation 1 (Emergent Wetlands): ***HU = (ORAM/100) x Acres***

Equation 2 (Scrub-Shrub Wetlands): ***HU = [((ORAM/100) + YW HSI)/2] x Acres***

Equation 3 (Forested Wetlands): ***HU = [((ORAM/100) + DWP HSI)/2] x Acres***

Equation 4 (Forested Buffer): ***HU = (DWP HSI) x Acres***

The HSI's will also be coupled with the Qualitative Habitat Evaluation Index (QHEI) to evaluate the function and quality of streams being impacted, as well as to assess stream mitigation success. The QHEI was developed by the OEPA as an index of macro-habitat quality for streams that have a drainage area larger than one square mile (OEPA 2006). This index is designed to provide a measure of habitat quality that generally corresponds to those physical factors that affect fish communities and which are generally important to other aquatic life (e.g., invertebrates). The QHEI is composed of six metrics which take into account variables such as bottom substrate, channel morphology, riparian cover, and other modifications to the stream reach. A QHEI measurement can have a maximum score of 100, with scores less than 30 identifying a very poor quality stream and scores of 70 or higher characterizing high quality streams.

Table 2.2. Functional Assessments proposed to evaluate impacts and mitigation habitat units for streams

Habitat Type	QHEI	Downy Woodpecker HSI
Ephemeral Stream	X	
Intermittent Stream	X	
Perennial Stream	X	
Forested Buffer		X

The QHEI scores will be determined for the existing and predicted future conditions for each of the habitat types except Forested Buffer. To adhere to the HEP framework, the QHEI scores will be standardized to a scale between zero and one by dividing by 100. The standardized QHEI scores will then be multiplied by the linear feet of habitat type to determine the habitat units (*HU*) of the existing and future conditions. The Downy woodpecker HSI will be used to assess the forested buffer proposed for the stream mitigation areas. The following equations will be used to calculate existing and future habitat units for a particular habitat type:

Equation 5 (Stream Type): ***HU = (QHEI/100) x LF***

Equation 6 (Forested Buffer): ***HU = (DWP HSI) x Acres***

Habitat units represent the quality of habitat provided by an area over the course of one year. The *without* project habitat units for each alternative assume that the existing condition will be maintained into the future, thus the habitat units would not change over a 50-year period. However, the *with* project scenarios for each type of habitat will have increasing annual habitat units based upon the time needed for the proposed restored habitat (e.g., vegetation) to reach maturity. The *with* project habitat units calculated represent the habitat quality once it has reached successional maturity. It is assumed that the emergent wetland habitat type will reach successional maturity within 5 years, scrub-shrub within 10 years, forested within 10-25 years and forested buffer within 25 years. It is assumed that the stream habitats will reach successional maturity within 5-10 years and the forested buffer will reach successional maturity within 25 years. Average annual habitat units (AAHU) will then calculated by averaging the annual habitat units for the 50 year life of the project.

The HEP and HSI's for yellow warbler and downy woodpecker have already been certified for use as a planning model. The ORAM and QHEI are currently recommended for approval by USACE Ecosystem Restoration Planning Center of Expertise (ECO-PCX) for regional use including the Eastern Corn Belt Plains and Huron/Erie Lake Plains Ecoregions which is where the Blanchard River Watershed is located.

2.4 Baseline Information

This section is largely incomplete at this time due to a lack of site access to verify and otherwise fully document site conditions.

2.4.1 Wetlands

2.4.1.1. Topography

The wetland mitigation areas are both relatively flat with difference in elevations of only a few feet and lands sloped from the highest elevations in the west to lower elevations along the eastern edge which abuts to the forested riparian corridor of the Blanchard River (Figure 2.7 and Figure 2.8)

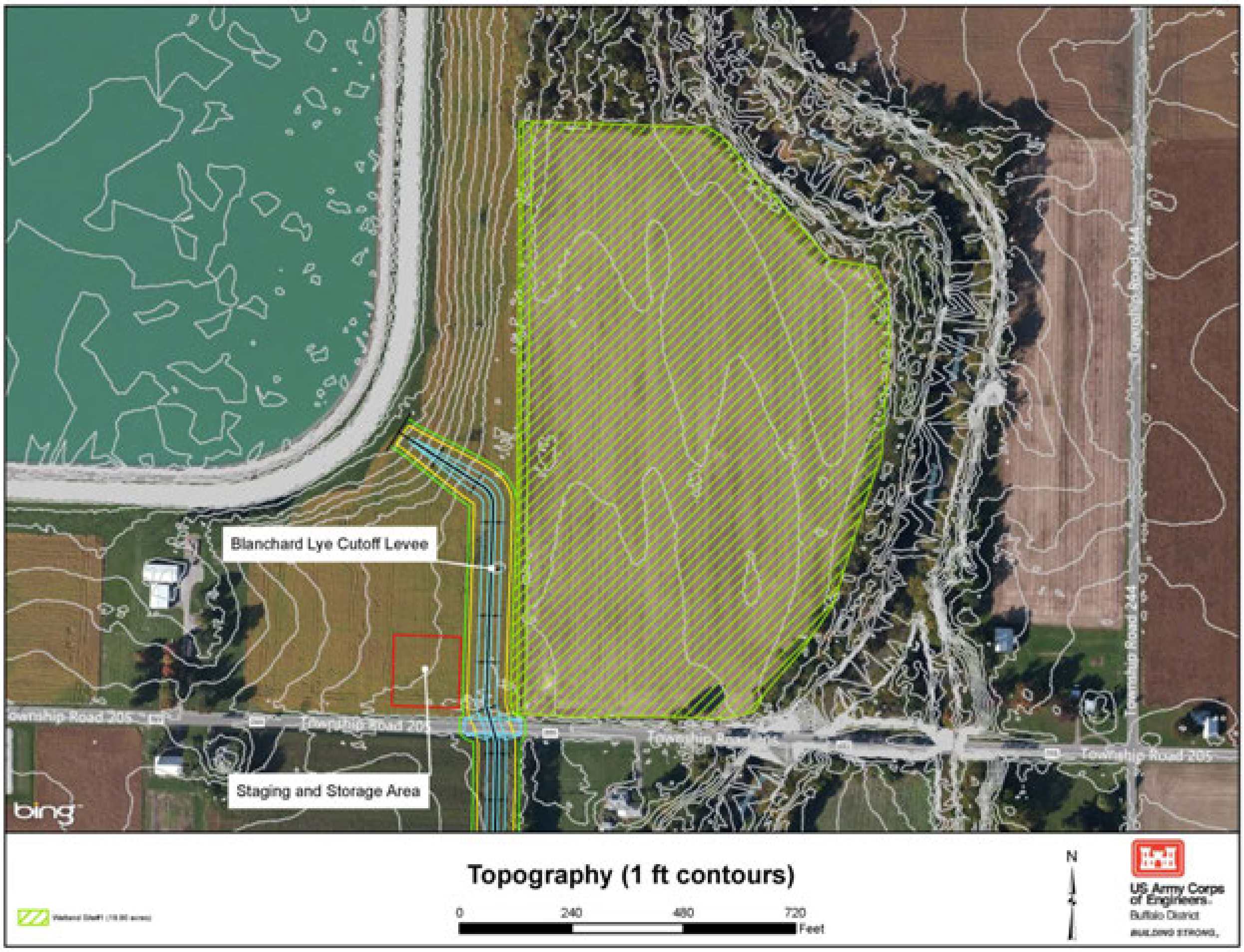

Figure 2.7: Topography (1 ft. contours) for proposed wetland mitigation area#1

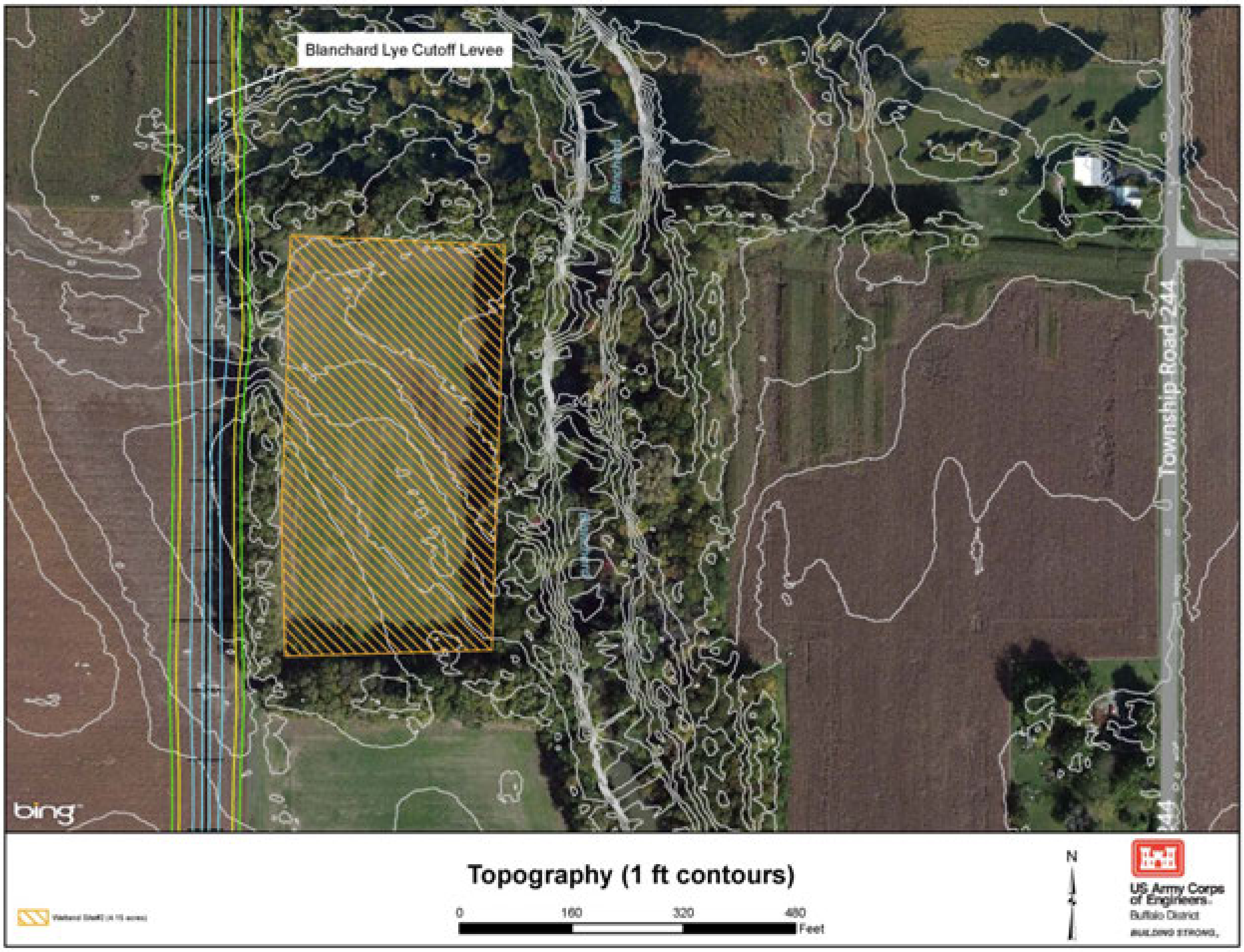

Figure 2.8: Topography (1 ft. contours) for proposed wetland mitigation area#2

2.4.1.2. Soils

The Hancock County Soil Survey mapped five different soils within the boundaries of potential wetland mitigation area #1: Flatrock silt loam, limestone substratum, 0-2% slopes (FdA); Sloan silty clay loam, limestone substratum, 0-1% slopes (SpA); Pewamo silty clay loam, 0-1% slopes (PmA); Shawtown loam, 0-2% slopes (SeA); and Medway silt loam, limestone substratum, 0-2% slopes (McA) (Figure 2.9). Two of these soils are identified as hydric soils, SpA and PmA.

Figure 2.9: Soils map for proposed wetland mitigation area #1

The Hancock County Soil Survey mapped two different soils within the boundaries of potential wetland mitigation area #2: FdA and SpA (Figure 2.10). As mentioned above, SpA is identified as a hydric soil.

Figure 2.10: Soils map for proposed wetland mitigation area#2

2.4.1.3. Hydrography

There are no mapped wetlands located with proposed wetland mitigation area #1 (Figure 2.11). There are OWI woods on hydric soils and emergent OWI wetlands mapped within proposed wetland mitigation area #2 (Figure 2.12), however, these areas were selected due to a lack of woody vegetation from current aerials (NAIP 2013). Thus these areas either no longer contain woody vegetation due to a change in land use since the OWI data was created in 1985 or these are mapping errors due to the scale at which the OWI layer was created from (cell size 30 meters by 30 meters). Existing wetland areas will be avoided or evaluated for potential enhancement given the fact these areas are currently in areas that contain cultivated crops (corn or soybean). Once access is granted to these areas, site specific evaluations can be done to delineate wetlands and make more detailed assessments of the baseline functions and values of these areas.

Figure 2.11: NWI and OWI wetland map for potential wetland mitigation area #1

Figure 2.12: NWI and OWI wetland map for potential wetland mitigation area #2

2.4.1.4. Vegetation

The aerial photography from 2013 and National Agricultural Statistics Service (NASS) data and Statistics for crops and plants from 2012 show that proposed wetland mitigation areas #1 and #2 are areas cultivated areas where corn and/or soybeans are grown (Figure 2.28 thru Figure 2.31). As mentioned previously in section 2.4.1.3, wetland mitigation area #2 also shows deciduous forest within the boundaries of the proposed area however this appears to be a result of scale mapping errors within the dataset.

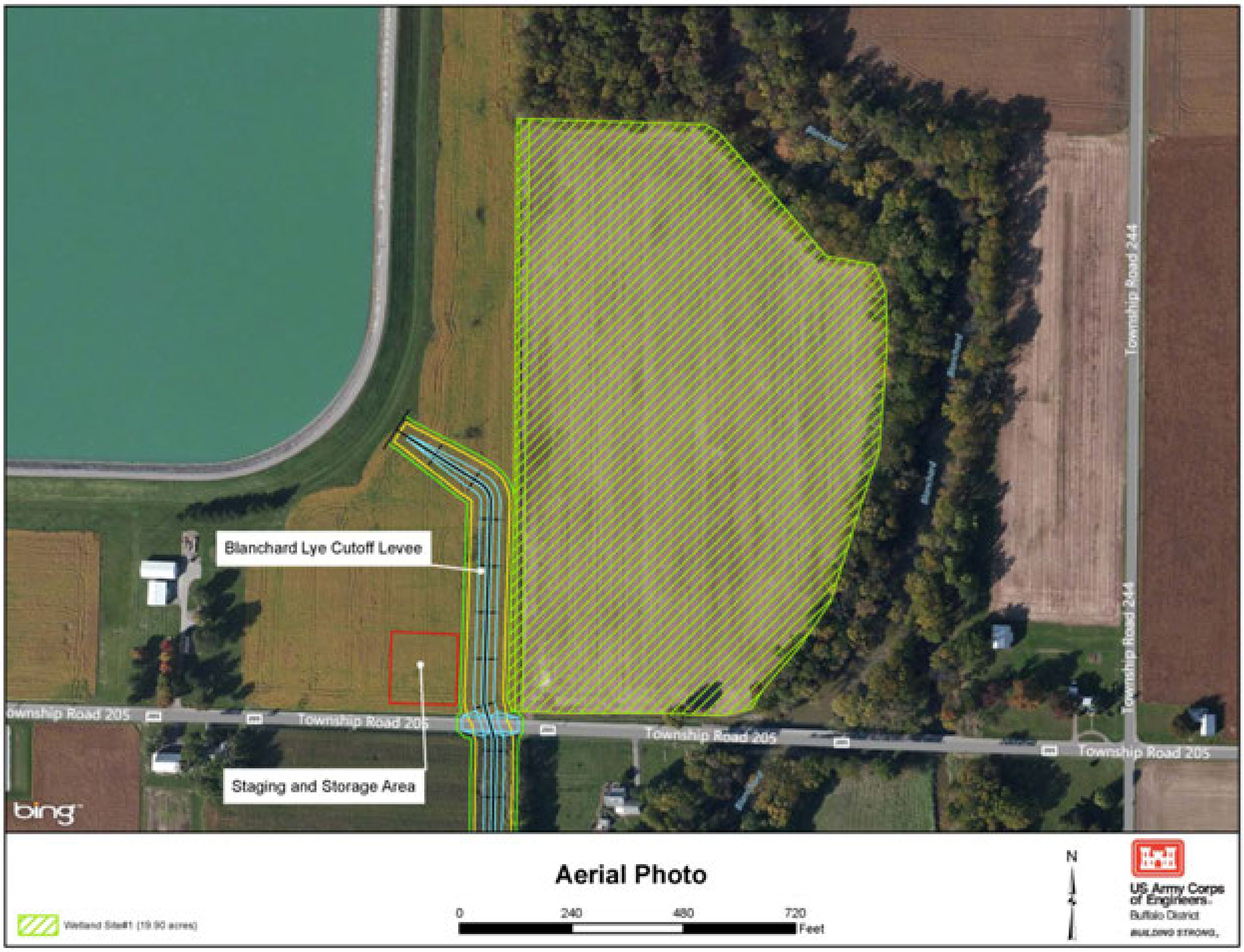

Figure 2.13: Aerial photograph of potential wetland mitigation area #1

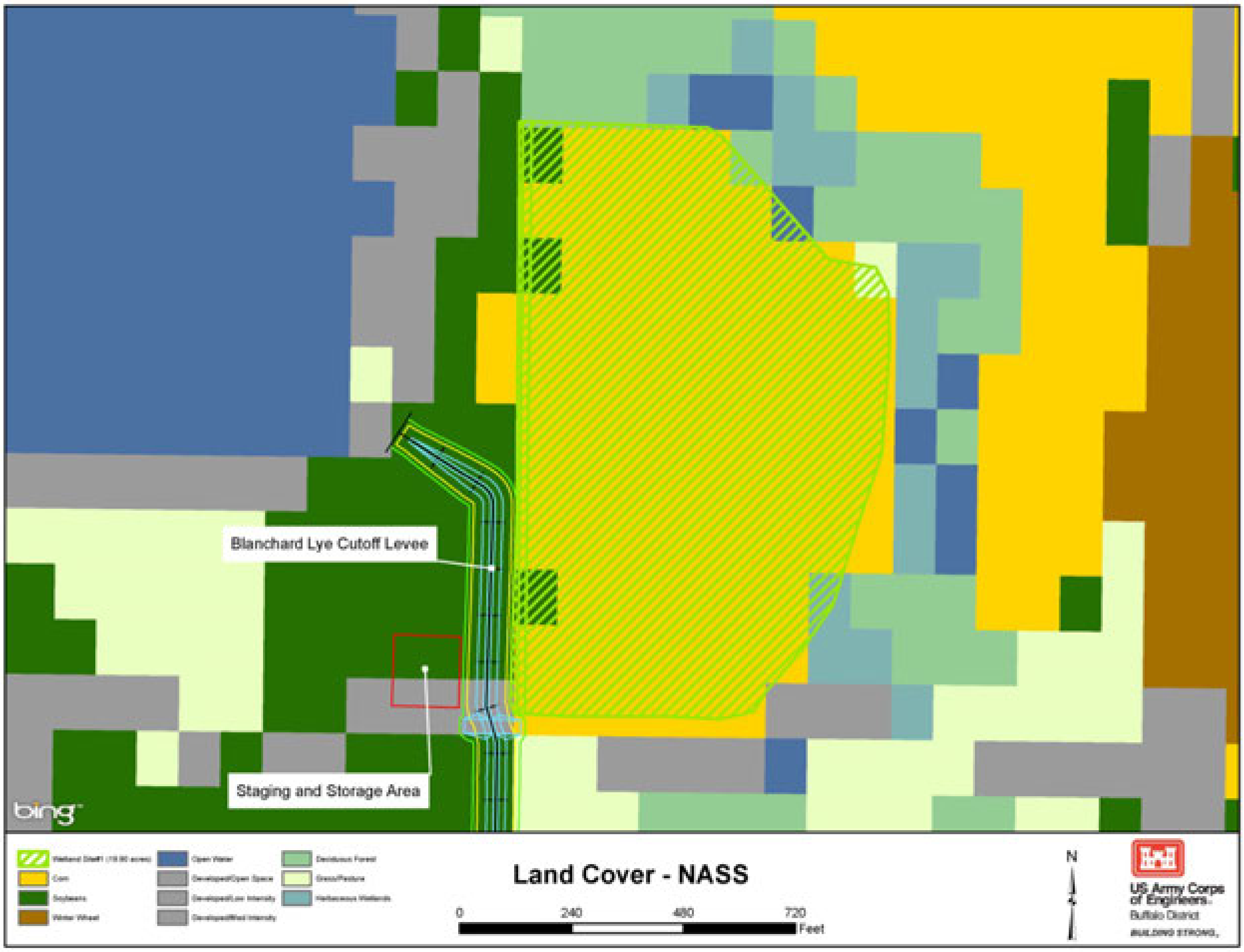

Figure 2.14: Land cover types within potential wetland mitigation area #1 (NASS 2012)

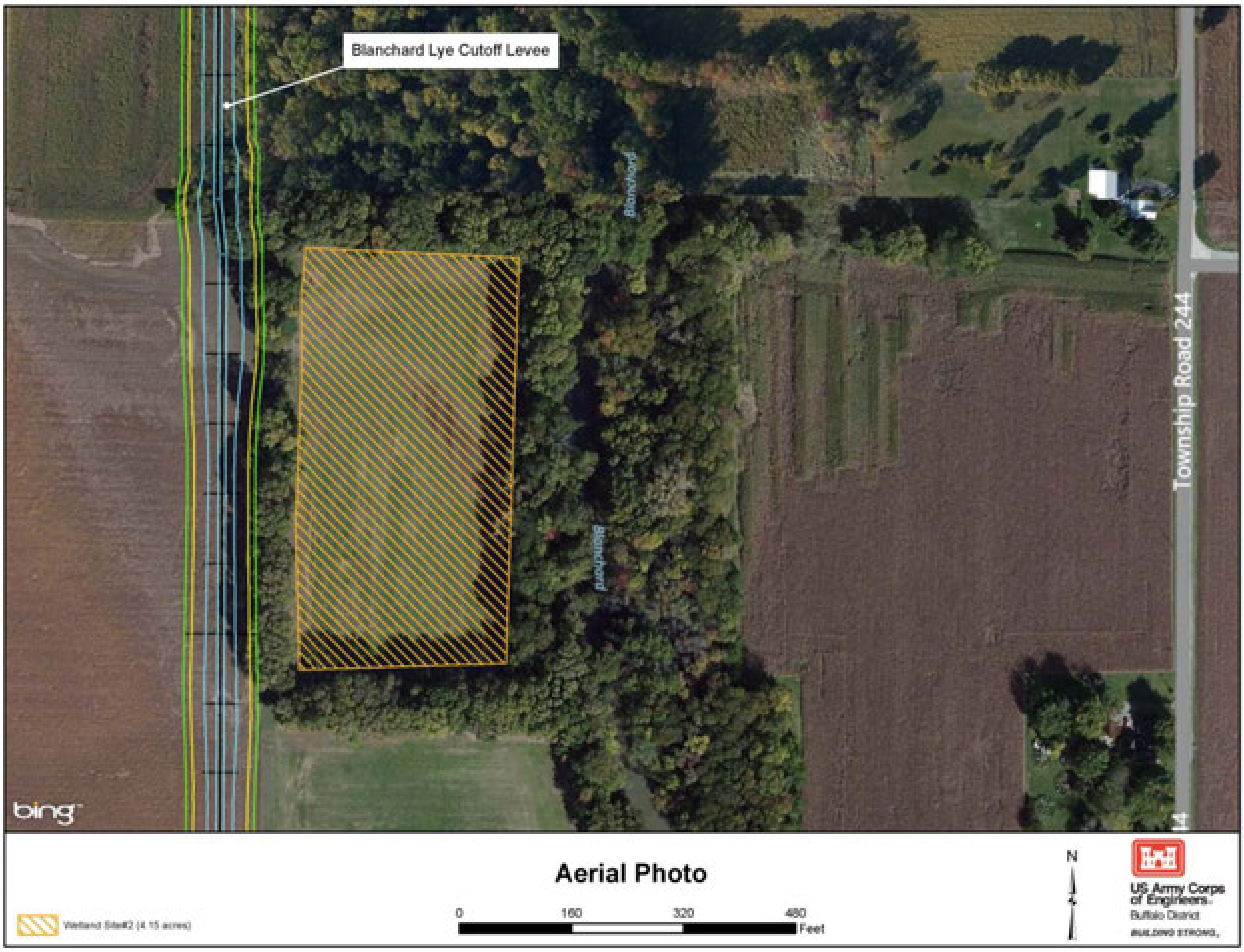

Figure 2.15:Aerial photograph of potential wetland mitigation area #2

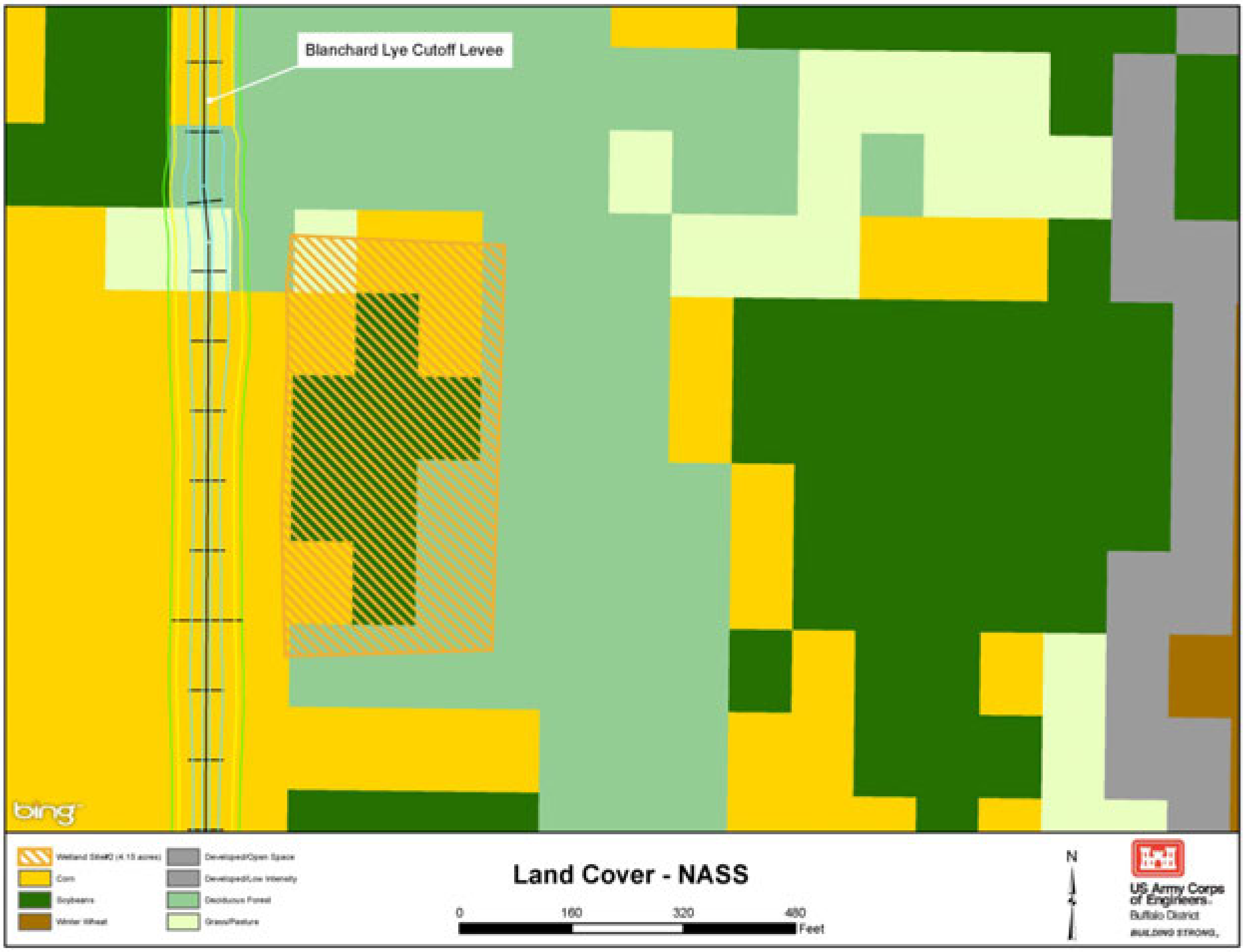

Figure 2.16: Land cover types within potential wetland mitigation area #2 (NASS 2012)

2.4.1.5. Land Use

The National Land Cover Database (2012) identifies the dominant land use for both proposed mitigation areas as being cultivated crops (Figure 2.17 and Figure 2.18). This dataset also shows emergent herbaceous wetlands found within the boundaries of proposed mitigation area #2 which will be investigated as soon as access is allowed on these parcels.

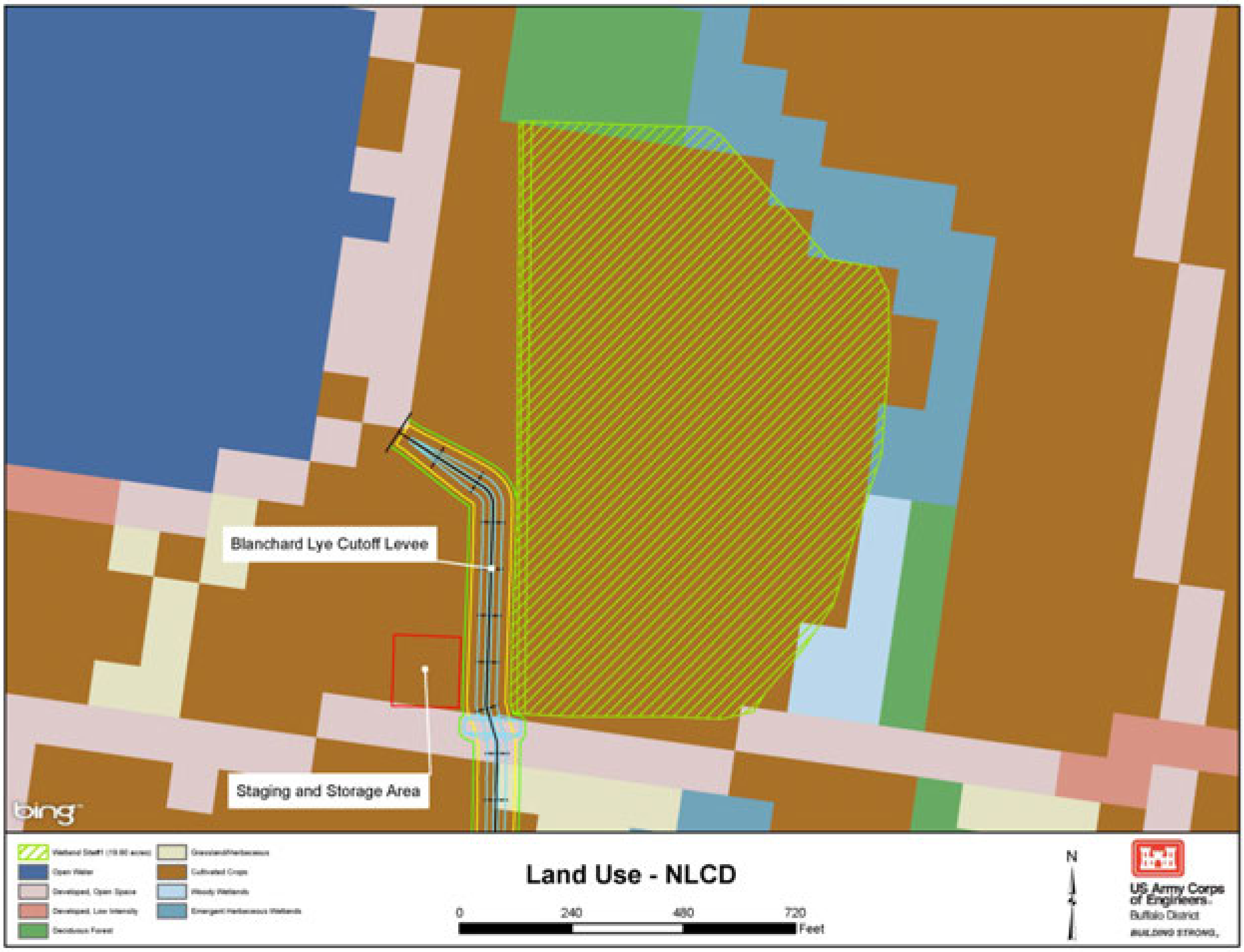

Figure 2.17: Land use types within potential wetland mitigation area #1 (NLCD 2011)

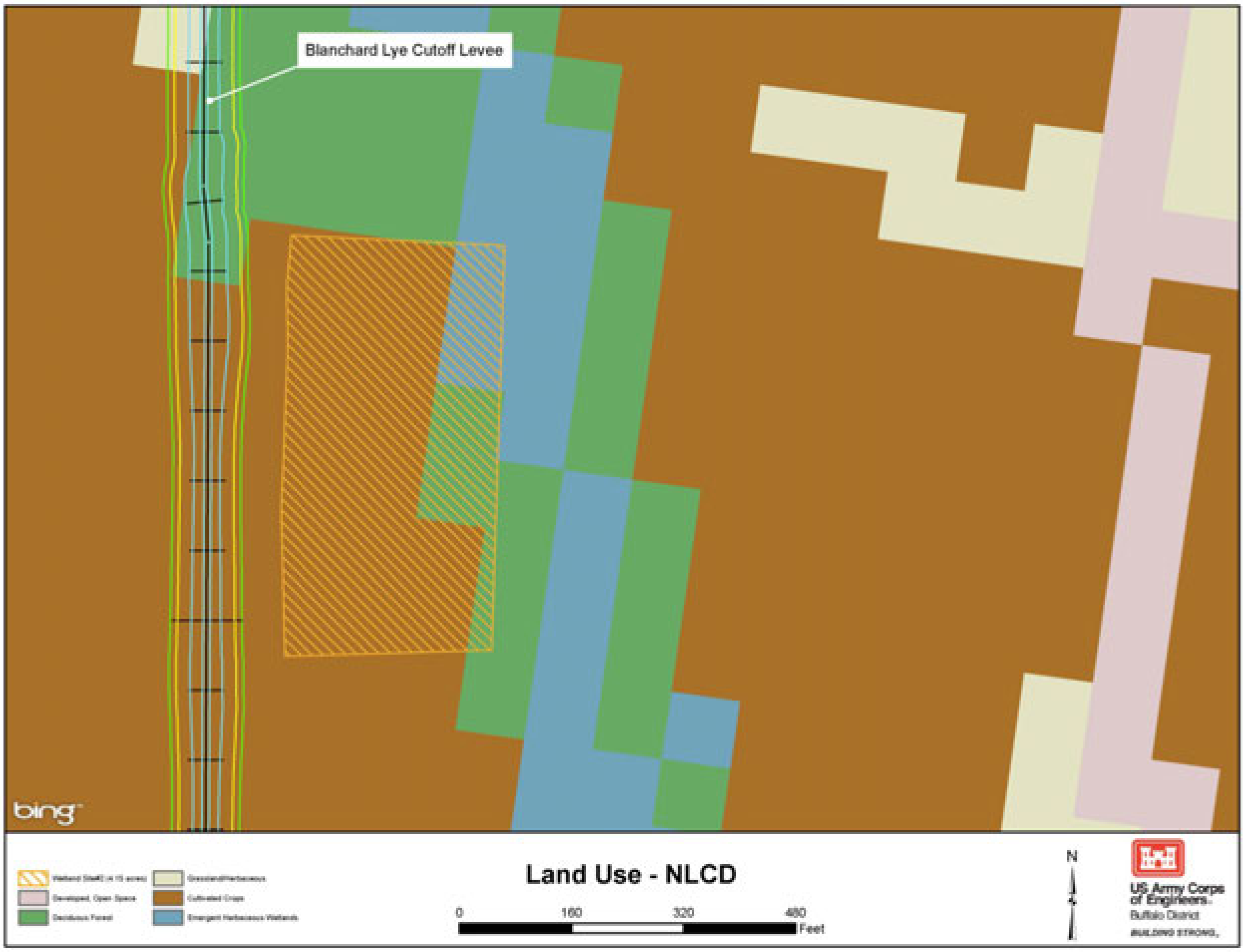

Figure 2.18: Land use types within potential wetland mitigation area #2 (NLCD 2011)

2.4.2 Streams

2.4.2.1. Topography

Stream mitigation area #1 is an approximately 1,450 linear foot section of Aurand Run with no forested or scub-shrub riparian buffer. The channel is deeply incised with relatively flat or gently sloped croplands that enable surface water and precipitation to flow into Aurand Run from both sides of the stream (Figure 2.19). Stream mitigation areas #2 and #3, which are approximately 4,900 linear foot and 2,750 linear foot segments of Lye Creek respectively, have similar characteristics to stream mitigation area #1 (Figure 2.20 and Figure 2.21). Each of these areas are located between existing woodlots or a forested riparian area.

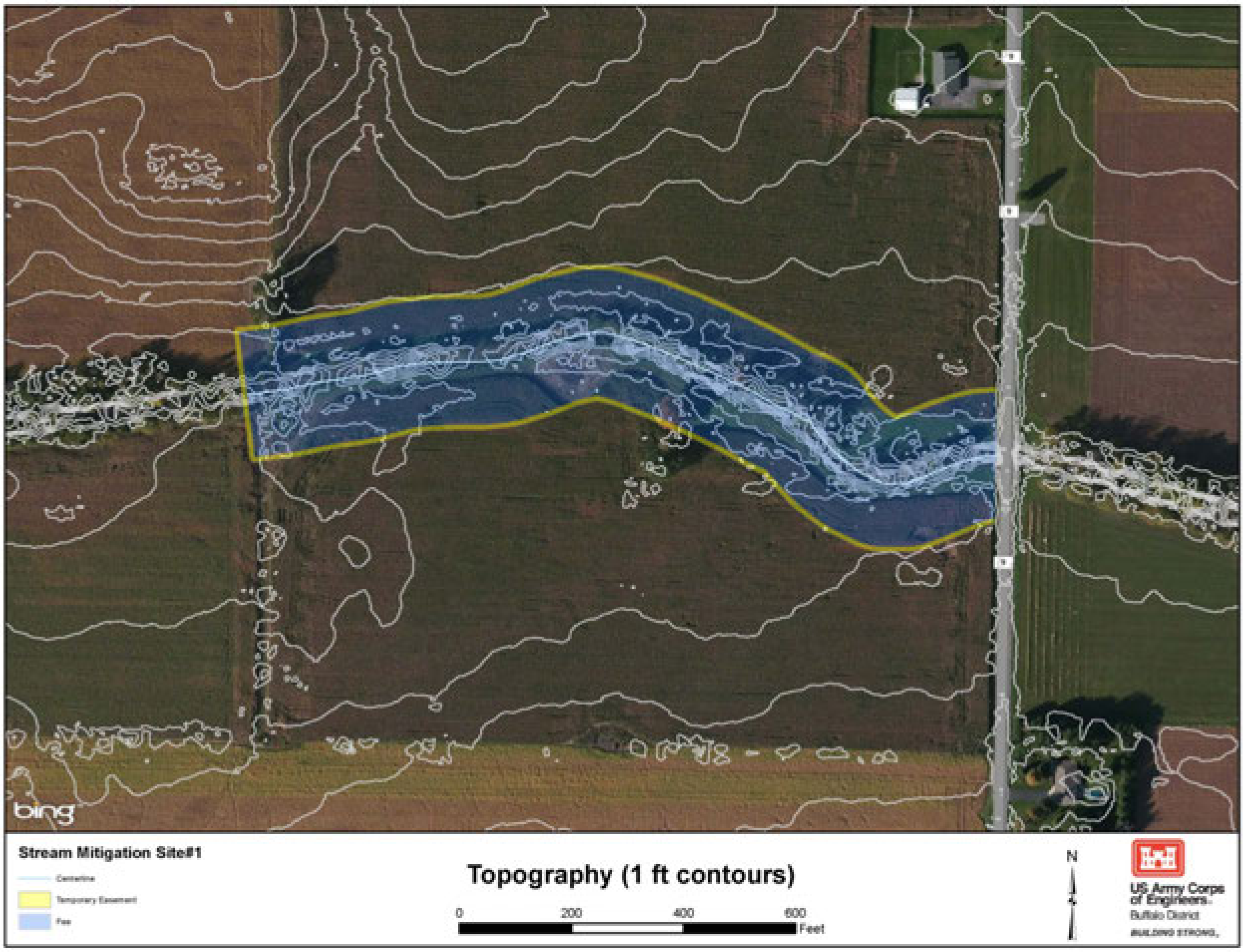

Figure 2.19: Topography (1 ft. contours) for proposed stream mitigation area#1 along Aurand Run

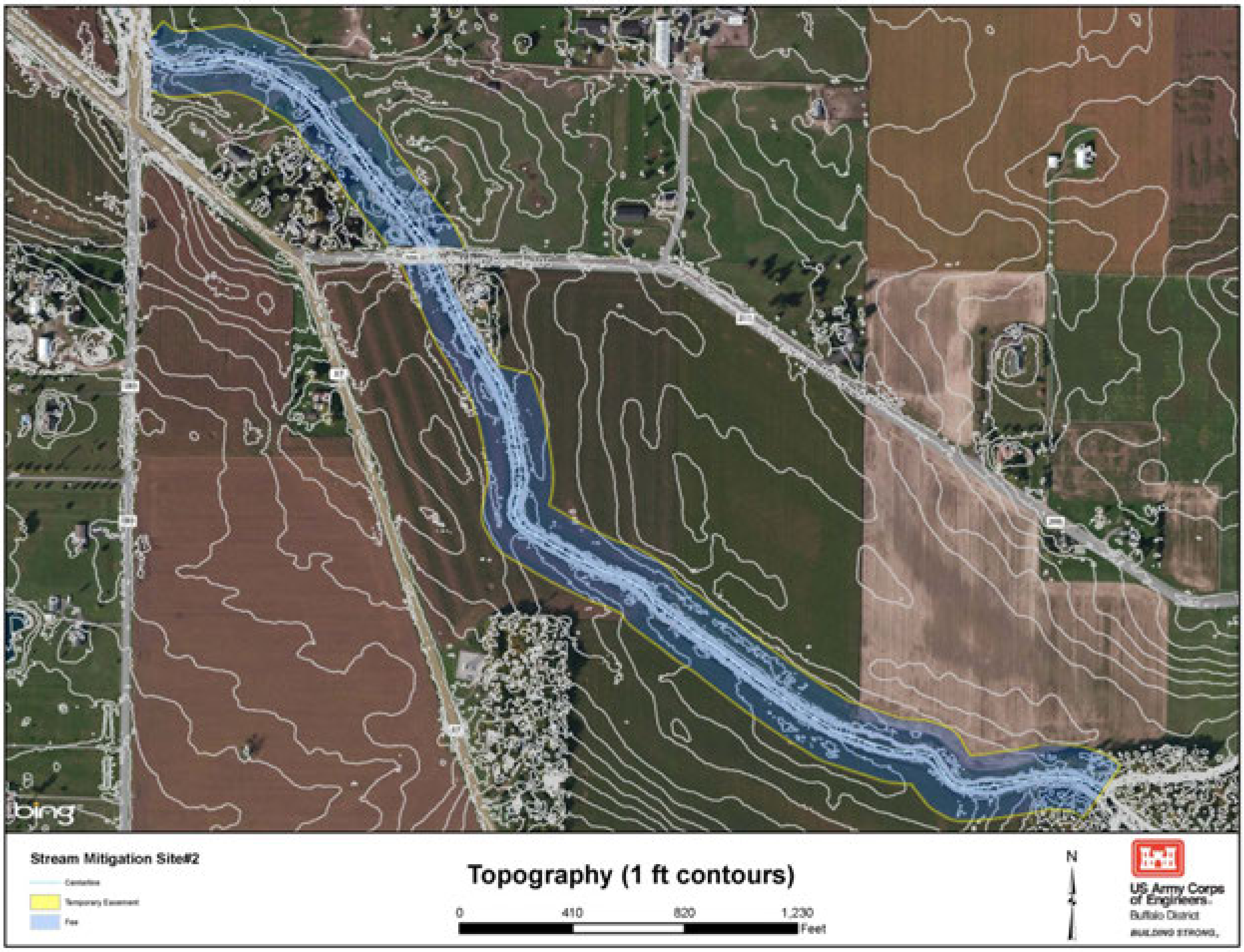

Figure 2.20: Topography (1 ft. contours) for proposed stream mitigation area#1 along Lye Creek

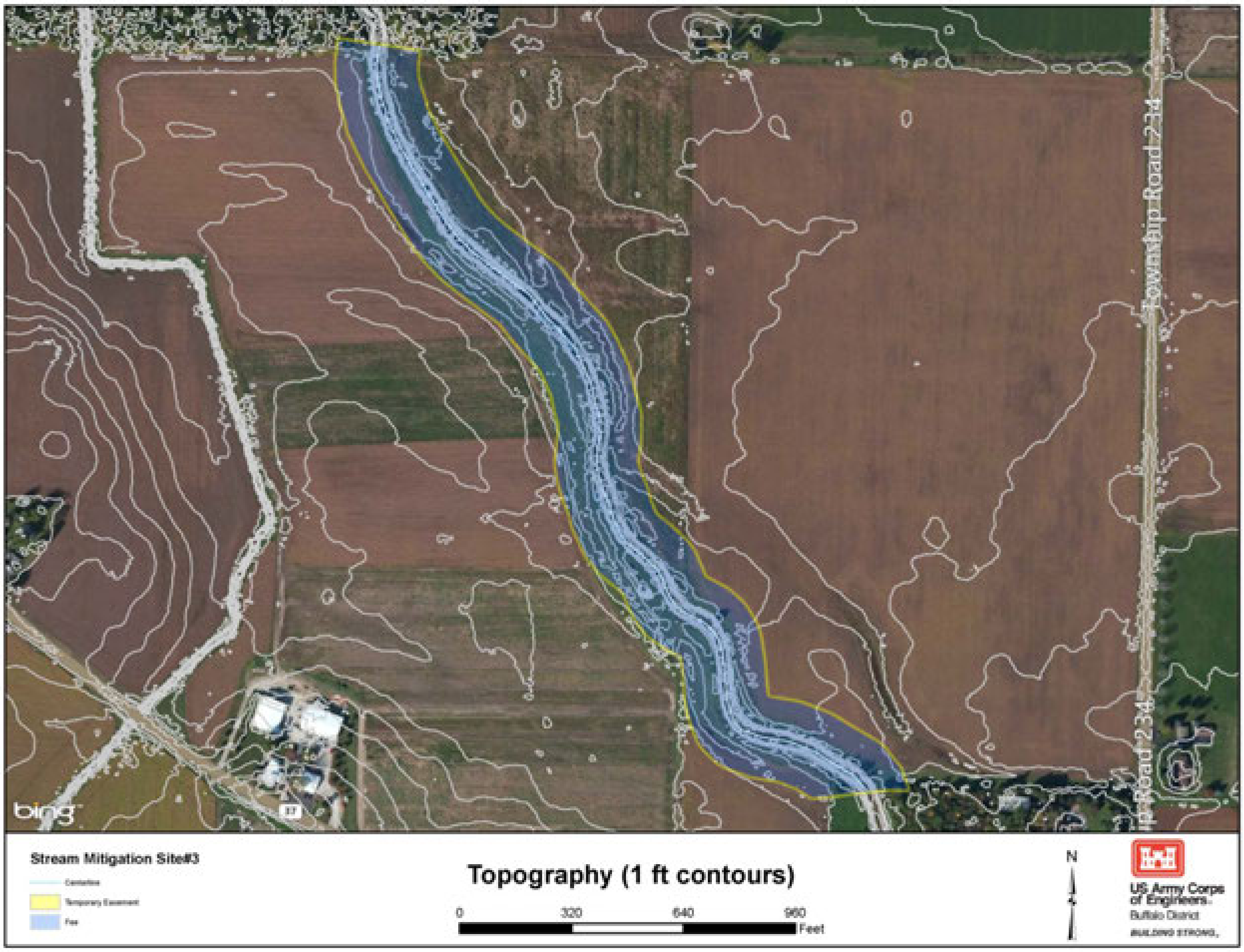

Figure 2.21: Topography (1 ft. contours) for proposed stream mitigation area#1 along Lye Creek

2.4.2.2. Soils

The Hancock County Soil Survey mapped four different soils within the boundaries of potential stream mitigation area #1: Millsdale silty clay loam, 0-1% slopes (MgA); Pewamo silty clay loam, 0-1% slopes (PmA); Harrod silt loam, 0-1% slopes (HaA); and Blount silt loam, 0-2% slopes (BoA) (Figure 2.22). MgA and PmA are identified as hydric soils and BoA is listed as a non-hydric soil with hydric inclusions.

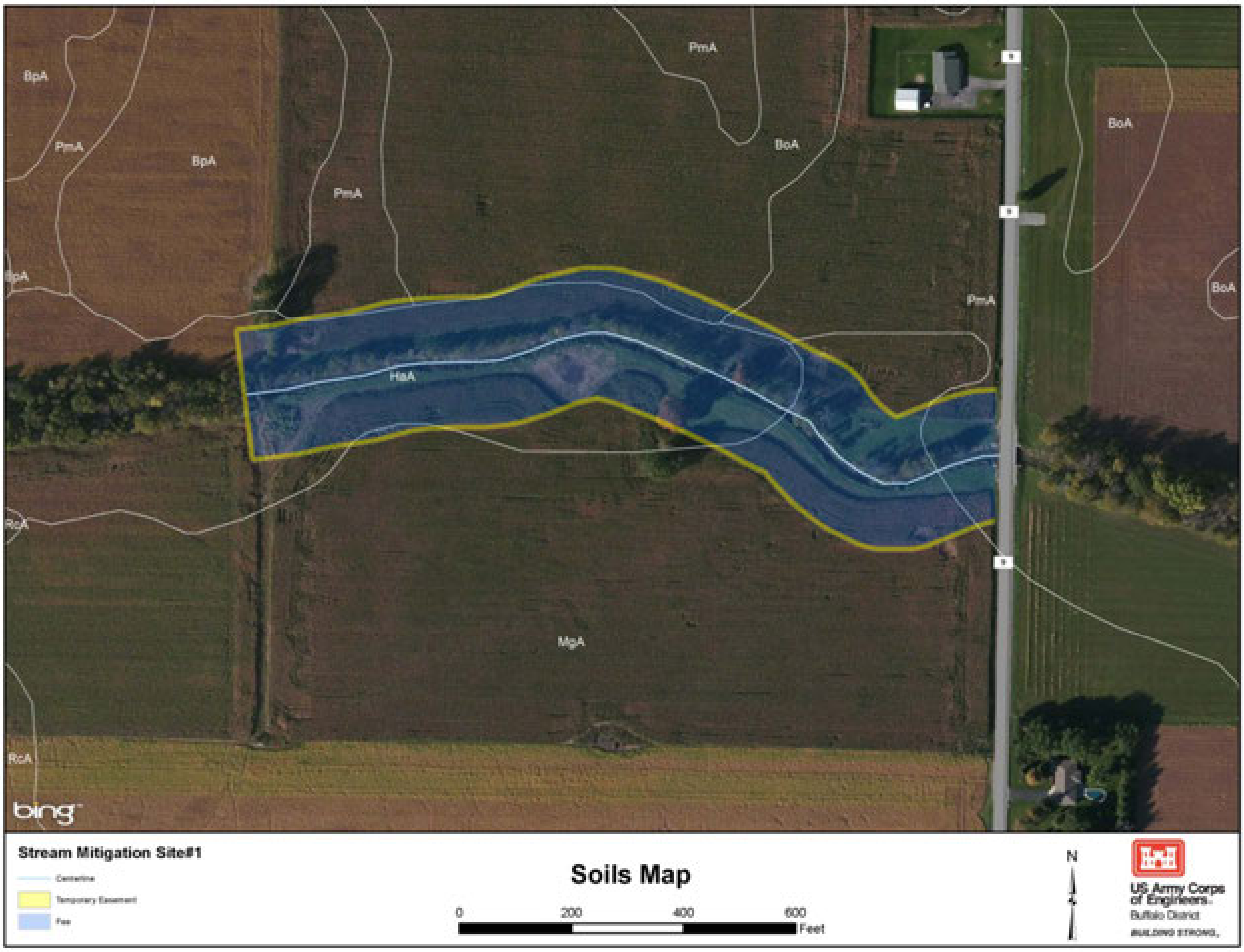

Figure 2.22: Soils map for proposed stream mitigation area #1 along Aurand Run

The Hancock County Soil Survey mapped five different soils within the boundaries of potential stream mitigation area #2: Oshtemo fine sandy loam, 0-2% slopes (OrA); Sloan silty clay loam, limestone substratum, 0-1% slopes (SpA); Harrod silt loam, 0-1% slopes (HaA); Lamberjack loam, 0-2% slopes (LbA); and Alvada loam, 0-1% slopes (AkA) (Figure 2.23). SpA and AkA are identified as hydric soils.

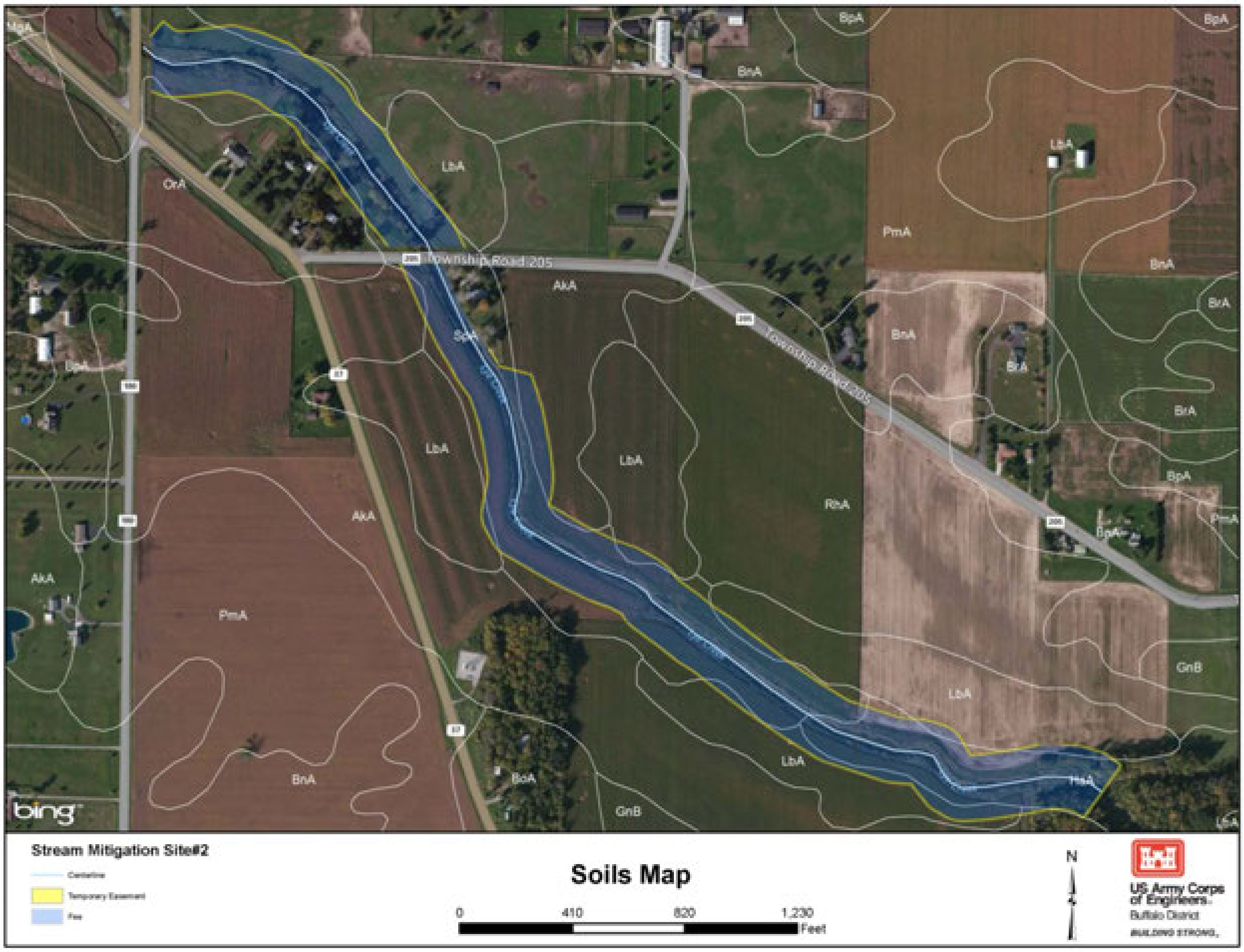

Figure 2.23: Soils map for proposed stream mitigation area #2 along Lye Creek

The Hancock County Soil Survey mapped four different soils within the boundaries of potential stream mitigation area #3: Millsdale silty clay loam, 0-1% slopes (MgA); Harrod silt loam, 0-1% slopes (HaA); Lamberjack loam, 0-2% slopes (LbA); and Alvada loam, 0-1% slopes (AkA) (Figure 2.24). MgA and AkA are identified as hydric soils.

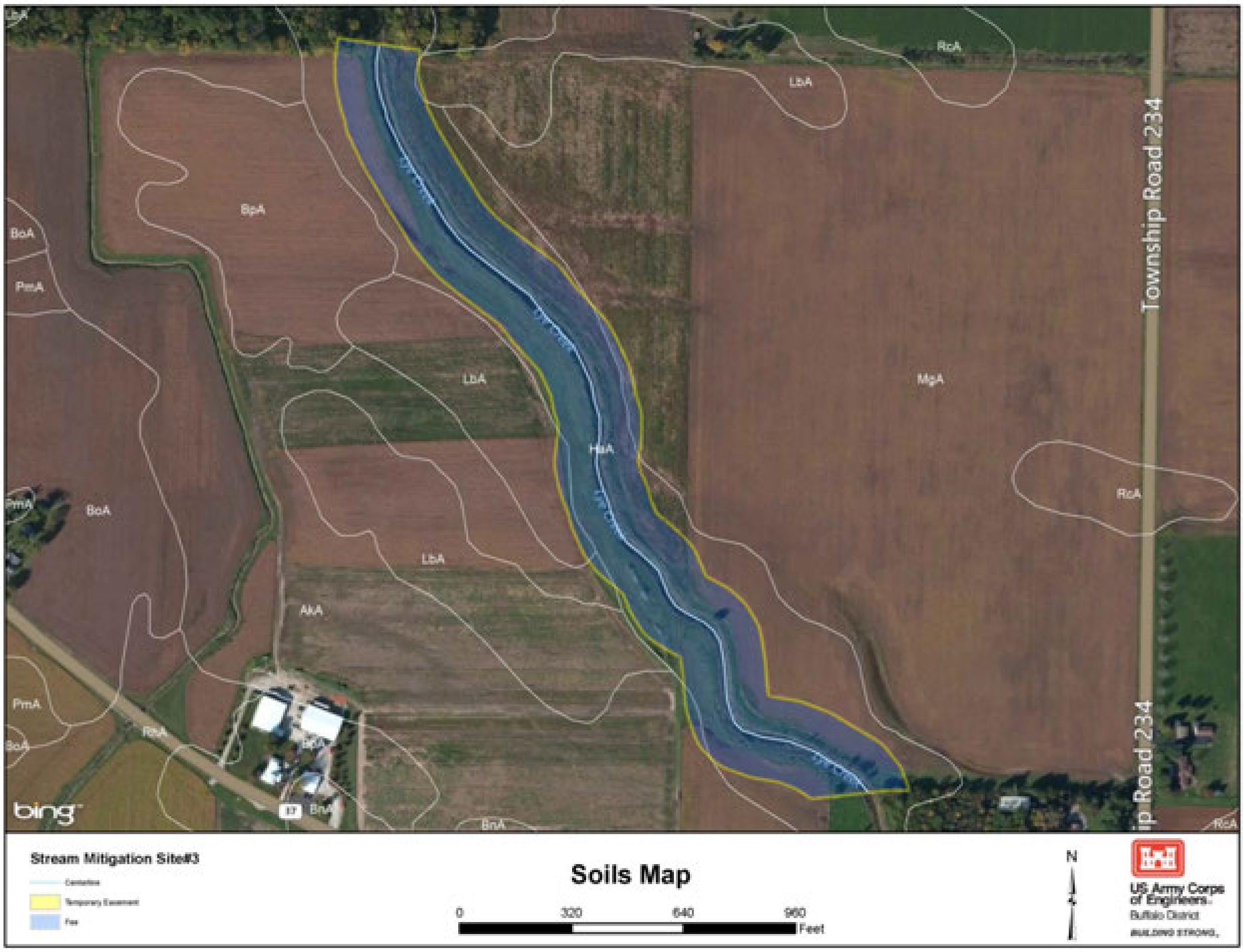

Figure 2.24: Soils map for proposed stream mitigation area #3 along Lye Creek

2.4.2.3. Hydrography

There are no mapped wetlands located with proposed stream mitigation area #1 or #3 (Figure 2.25 and Figure 2.27). There are NWI wetlands, OWI woods on hydric soils, and emergent OWI wetlands mapped within proposed stream mitigation area #2 (Figure 2.26), however, these areas were selected due to a lack of woody vegetation from current aerials (NAIP 2013). Thus these areas either no longer contain woody vegetation due to a change in land use since the OWI data was created in 1985 or NWI data was created in 2007 or more likely these are mapping errors due to the scale at which the OWI layer was created from (cell size 30 meters by 30 meters). Once access is granted to these areas, site specific evaluations can be done to delineate wetlands and make more detailed assessments of the baseline functions and values of these areas to ensure avoidance of impacts to wetlands in the proposed mitigation areas.

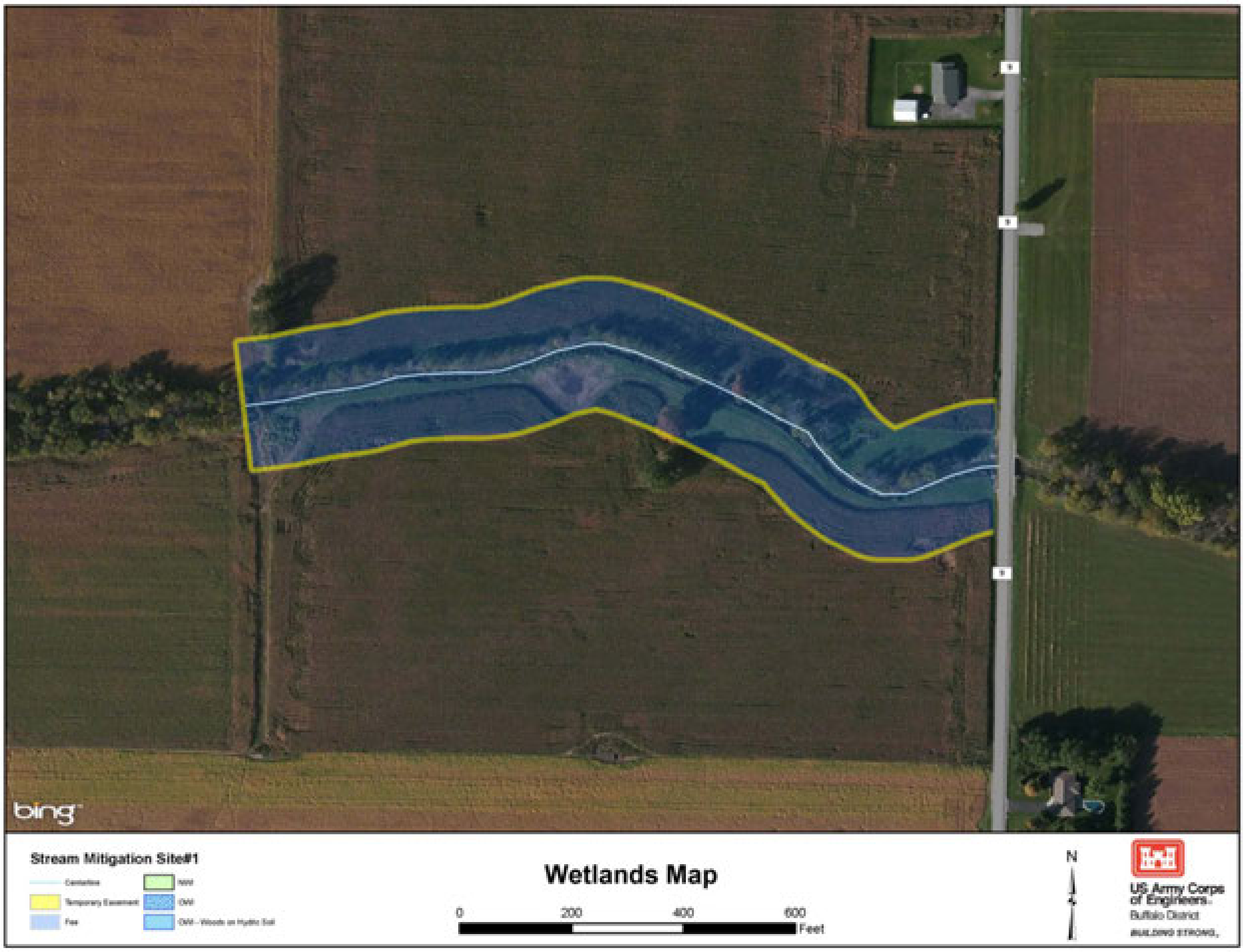

Figure 2.25: NWI and OWI wetland map for potential stream mitigation area #1

Figure 2.26: NWI and OWI wetland map for potential stream mitigation area #2

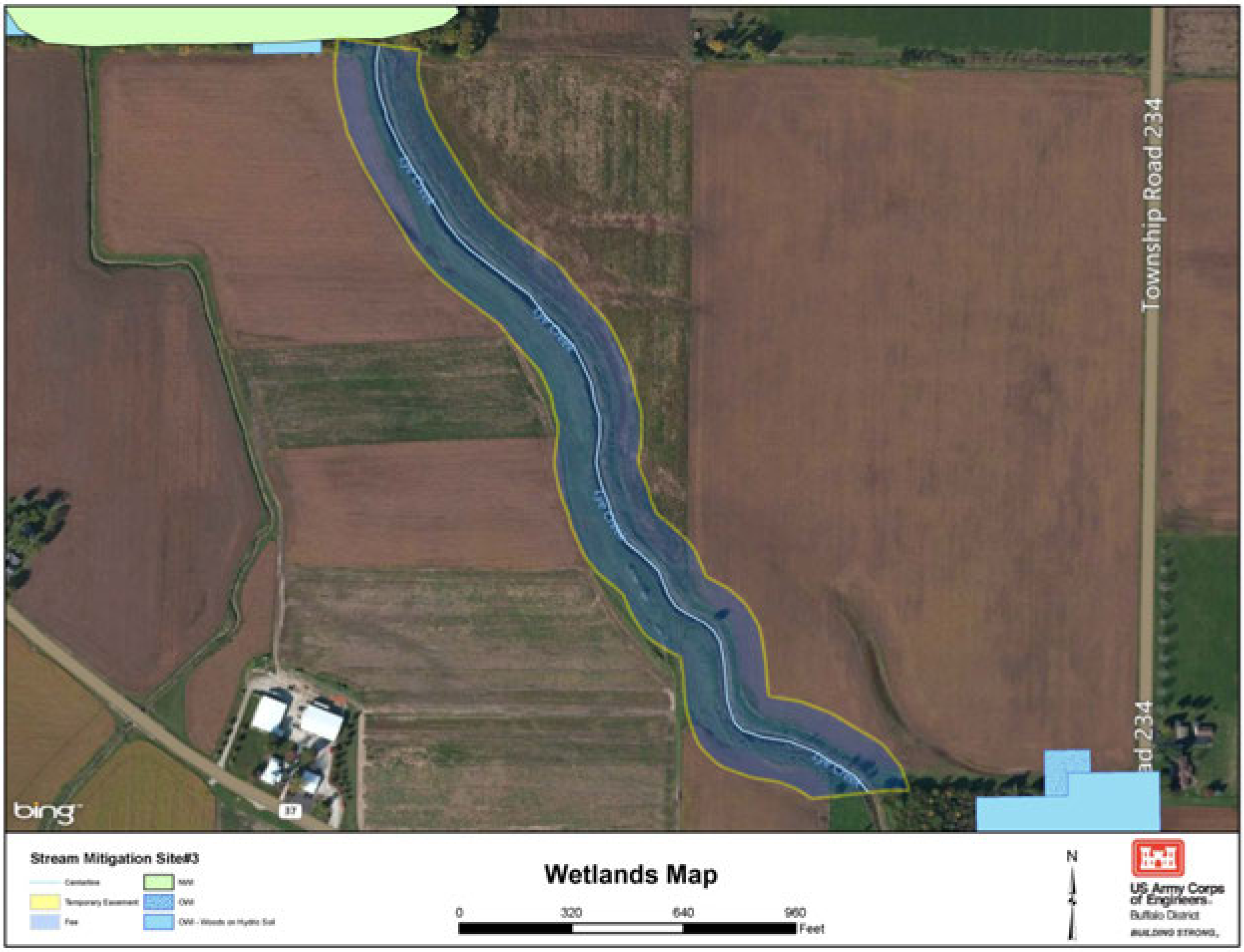

Figure 2.27: NWI and OWI wetland map for potential stream mitigation area #3

2.4.2.4. Vegetation

The aerial photography from 2013 and National Agricultural Statistics Service (NASS) data and Statistics for crops and plants from 2012 show that proposed stream mitigation areas #1, #2, and#3 are areas cultivated areas where corn and/or soybeans are grown (Figure 2.28 thru Figure 2.33). Stream mitigation area #2 also shows some developed/open space areas in the most downstream areas with grass pasture land (Figure 2.31). Stream mitigation area#3 also shows some grass/pasture land within the central portion of the area (Figure 2.33). As mentioned previously in section 2.4.2.3, wetland mitigation area #2 also shows deciduous forest within the boundaries of the proposed area however this appears to be a result of scale mapping errors within the dataset.

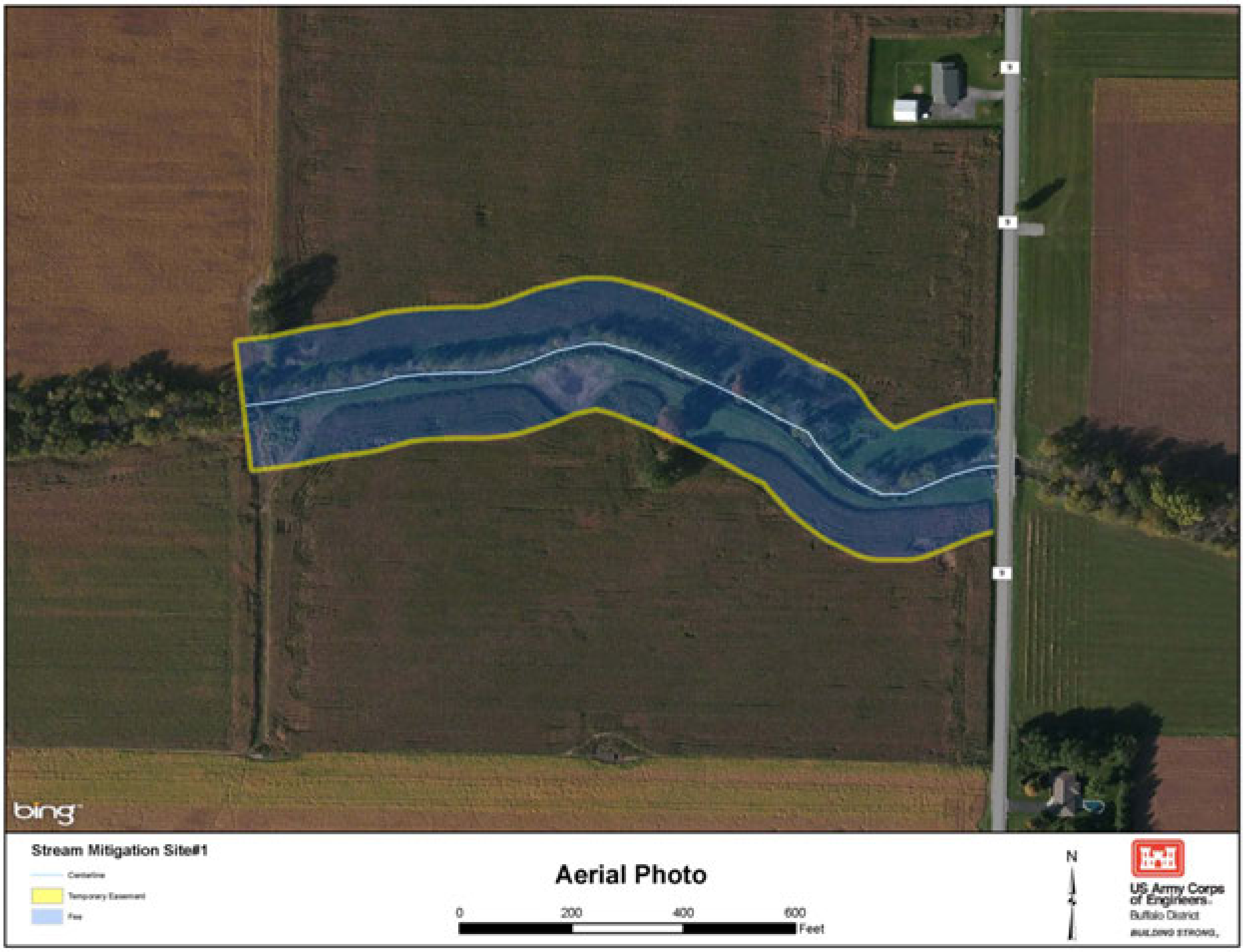

Figure 2.28: Aerial photograph of potential stream mitigation area #1

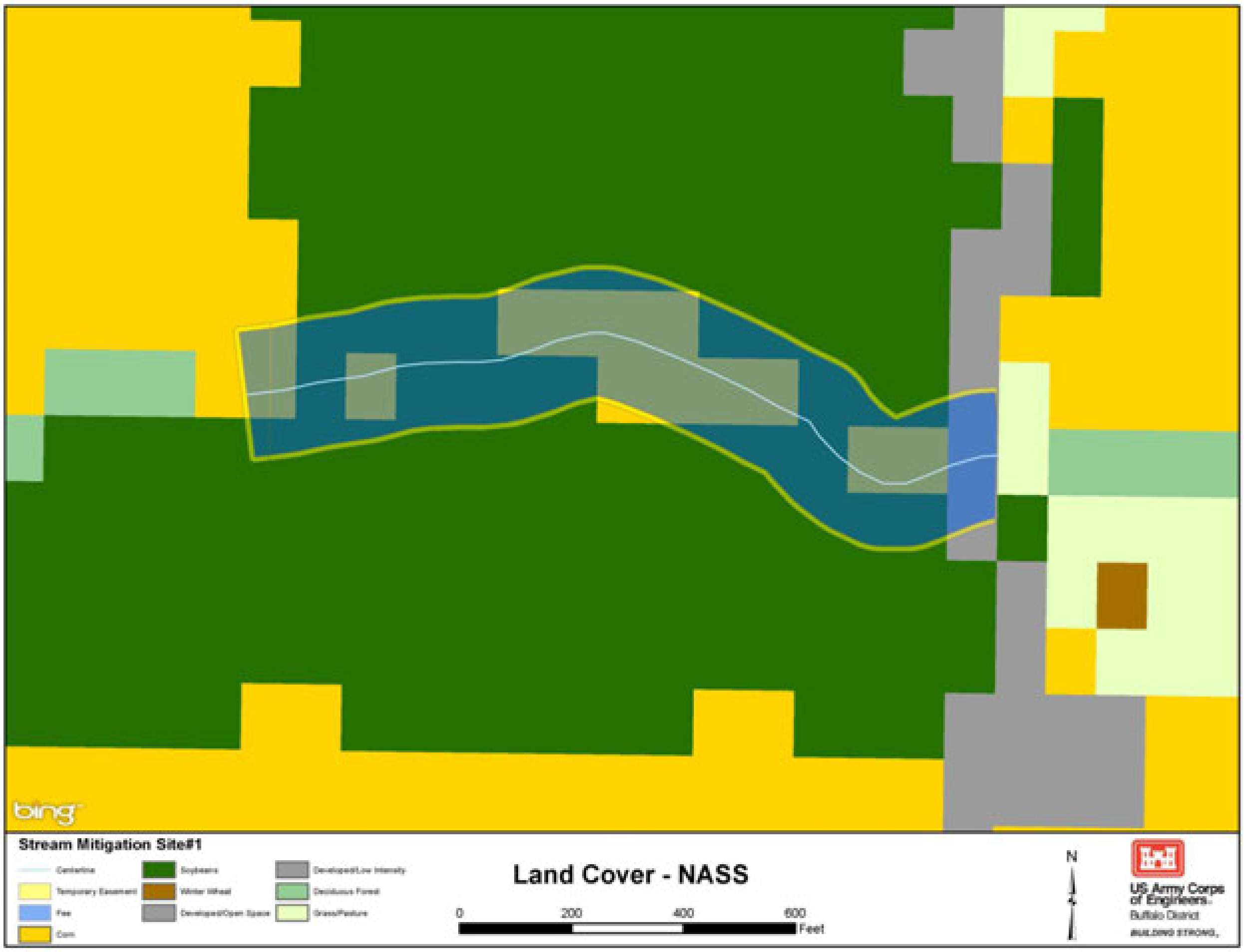

Figure 2.29: Land cover types within potential stream mitigation area #1 (NASS 2012)

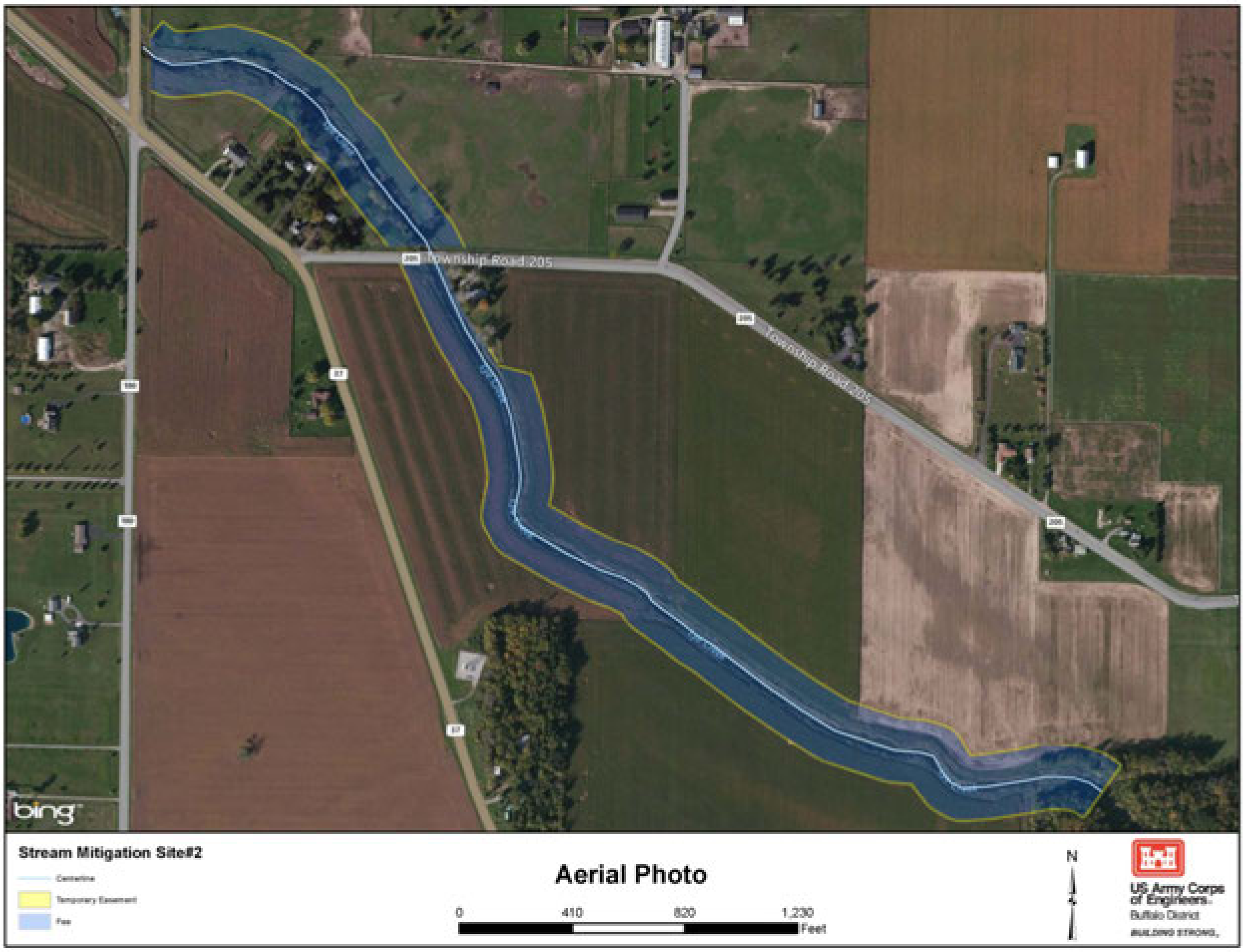

Figure 2.30: Aerial photograph of potential stream mitigation area #2

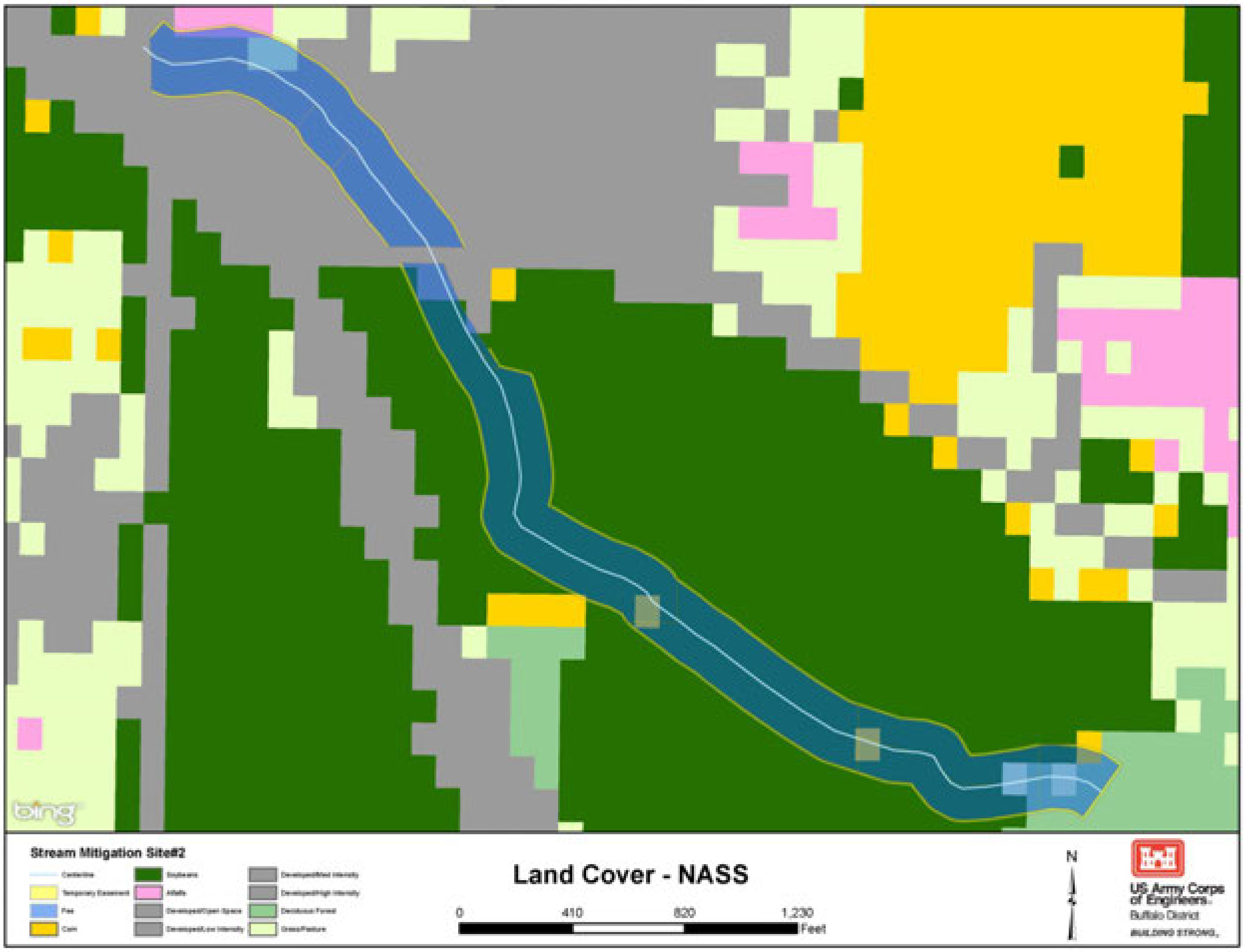

Figure 2.31: Land cover types within potential stream mitigation area #2 (NASS 2012)

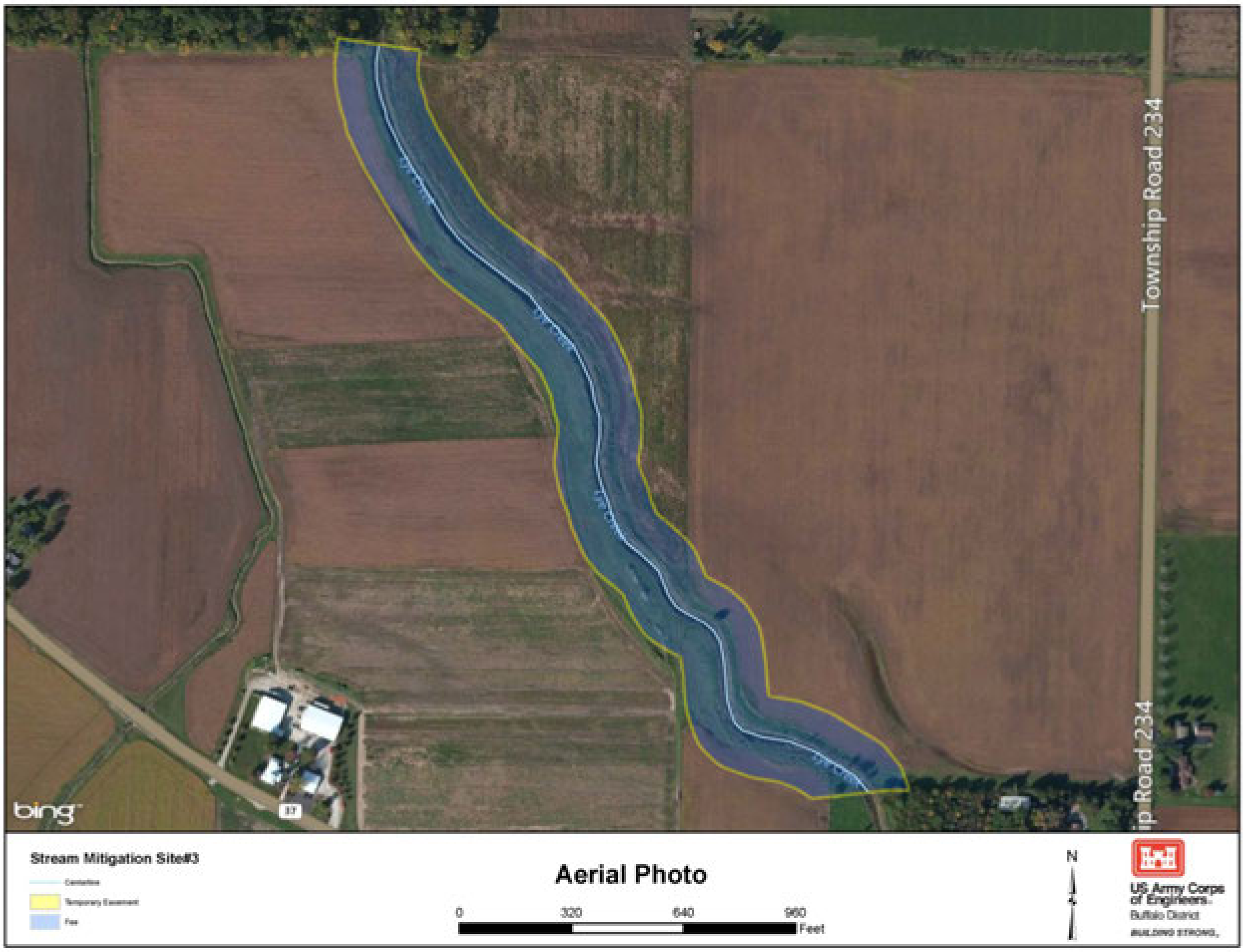

Figure 2.32: Aerial photograph of potential stream mitigation area #3

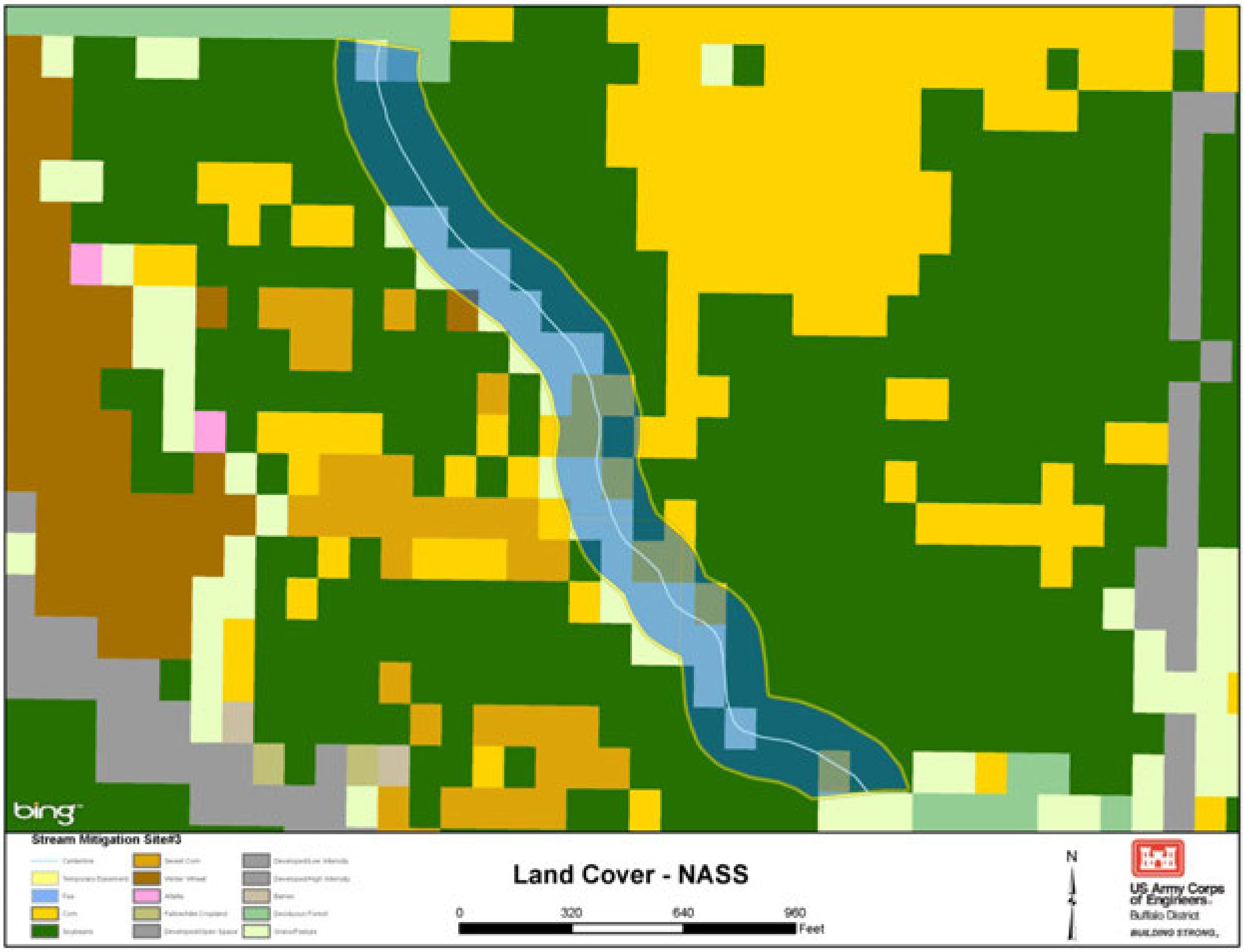

Figure 2.33: Land cover types within potential stream mitigation area #3 (NASS 2012)

2.4.2.5. Land Use

The National Land Cover Database (2012) identifies the dominant land use for the proposed stream mitigation areas as being predominantly cultivated crops (Figure 2.34 thru Figure 2.36). This dataset also shows some developed open space within the upstream areas of stream mitigation area #1 and downstream area of stream mitigation area #2. The forested areas found within the boundaries of proposed mitigation area #2 and #3 will be investigated as soon as access is allowed on these parcels.

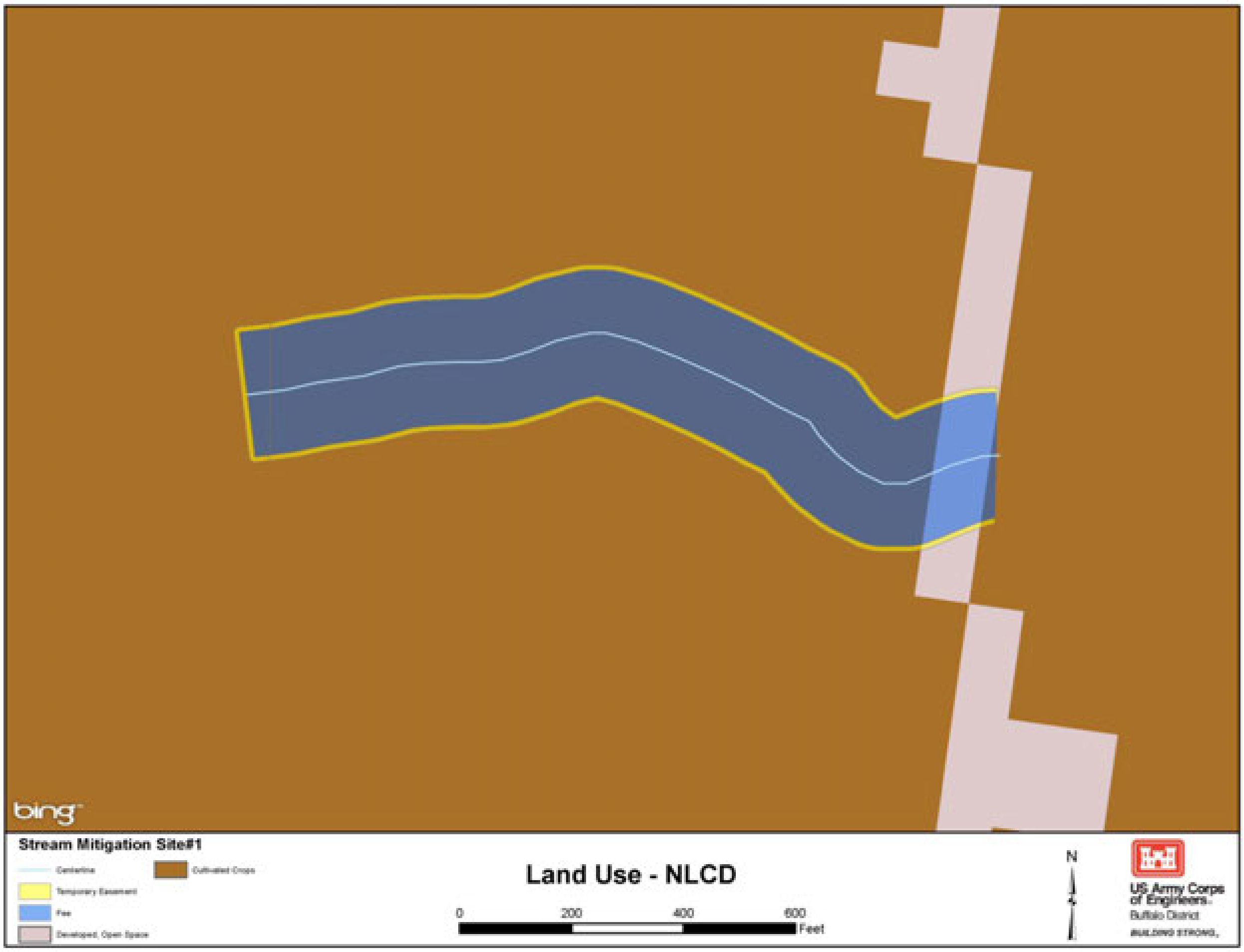

Figure 2.34: Land use types within potential stream mitigation area #1 (NLCD 2011)

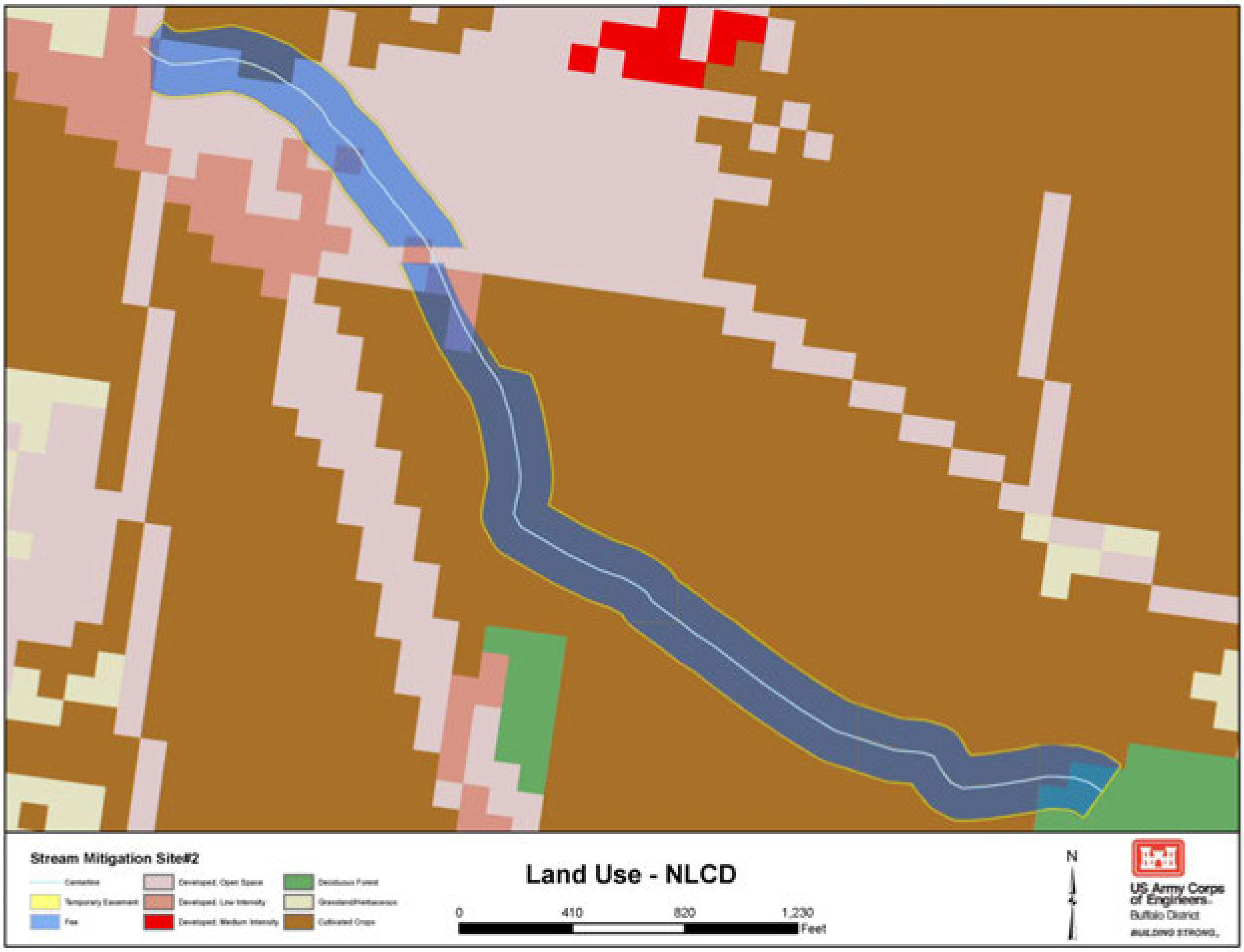

Figure 2.35: Land use types within potential stream mitigation area #2 (NLCD 2011)

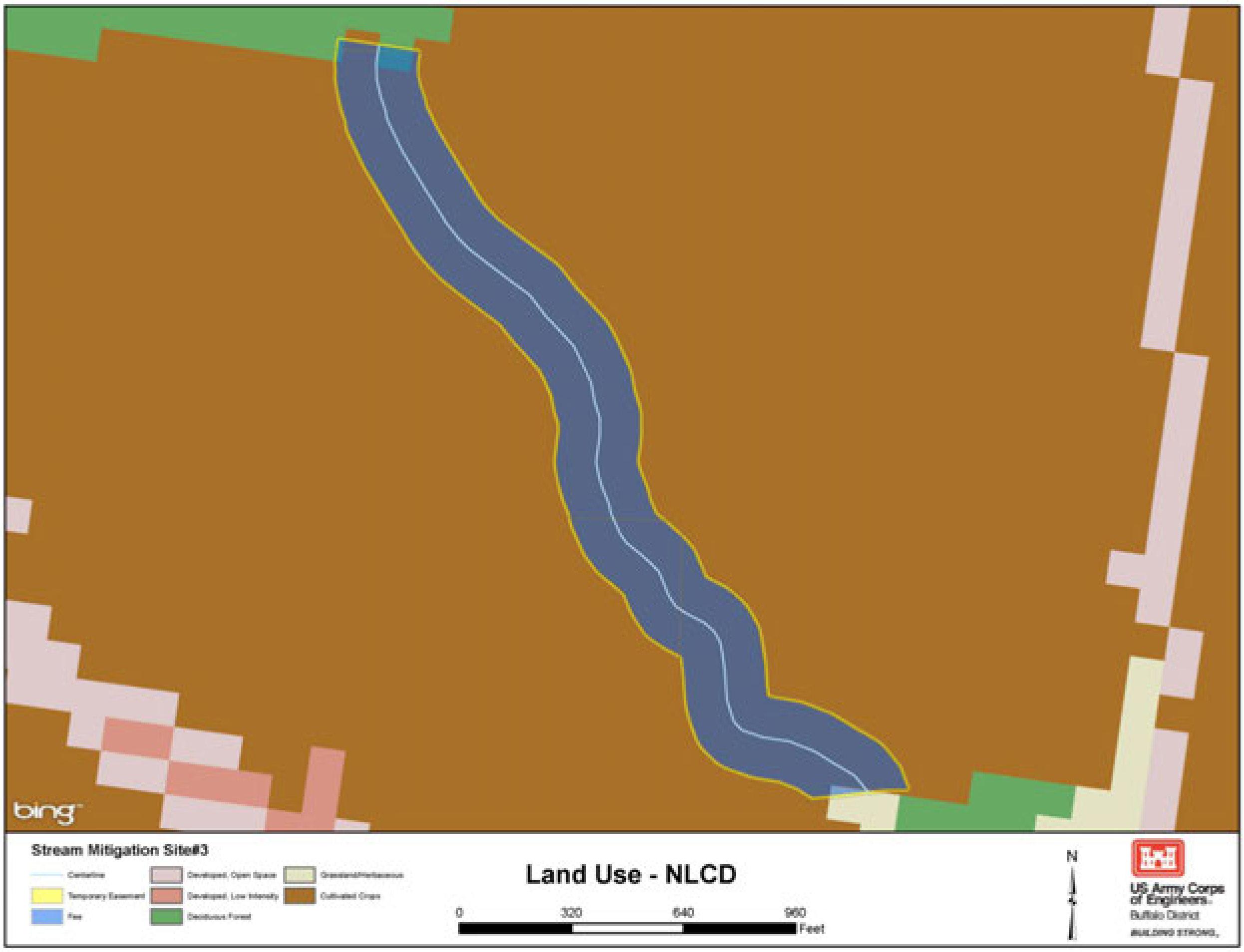

Figure 2.36: Land use types within potential stream mitigation area #3 (NLCD 2011)

2.5 Mitigation Plan

The USACE is currently proposing to restore at least 23.2 acres of forested/scrub-shrub wetlands (i.e., 11.6 acres of impact at a 2:1 mitigation ratio) adjacent to the Blanchard River as compensatory mitigation to offset the unavoidable impacts to freshwater wetlands and to ensure a no net loss to the functions and values of special aquatic sites in the Blanchard Watershed. The appropriate Real Estate interest (e.g., easement, fee, etc) for lands where mitigation is proposed will be provided by the non-federal sponsor to support the construction, operation and maintenance of the project. Generally, lands for fish and wildlife mitigation, ecosystem restoration, and other environmental purposes require fee ownership. However, a permanent or temporary easement may be appropriate based on the extent of interest required for the operation or other requirements of a project. As part of finalizing this MMP, the USACE will use the "Guidelines for Wetland Mitigation Banking in Ohio" to develop habitat restoration planting plans, success criteria, and monitoring protocols. Potential corrective actions would also be developed for possible implementation in the event mitigation areas do not achieve success criteria.

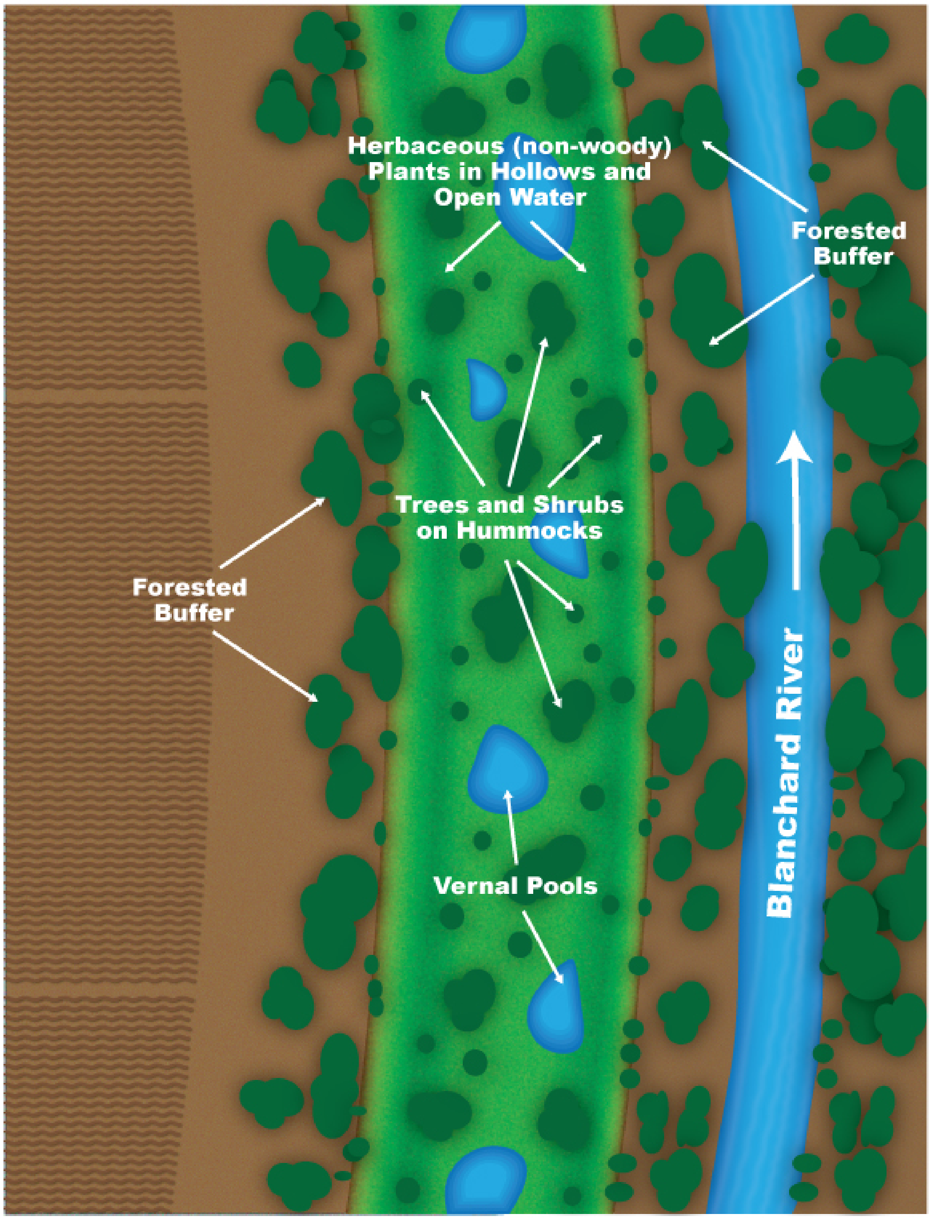

Figure 2.37: Plan view of proposed conceptual wetland mitigation

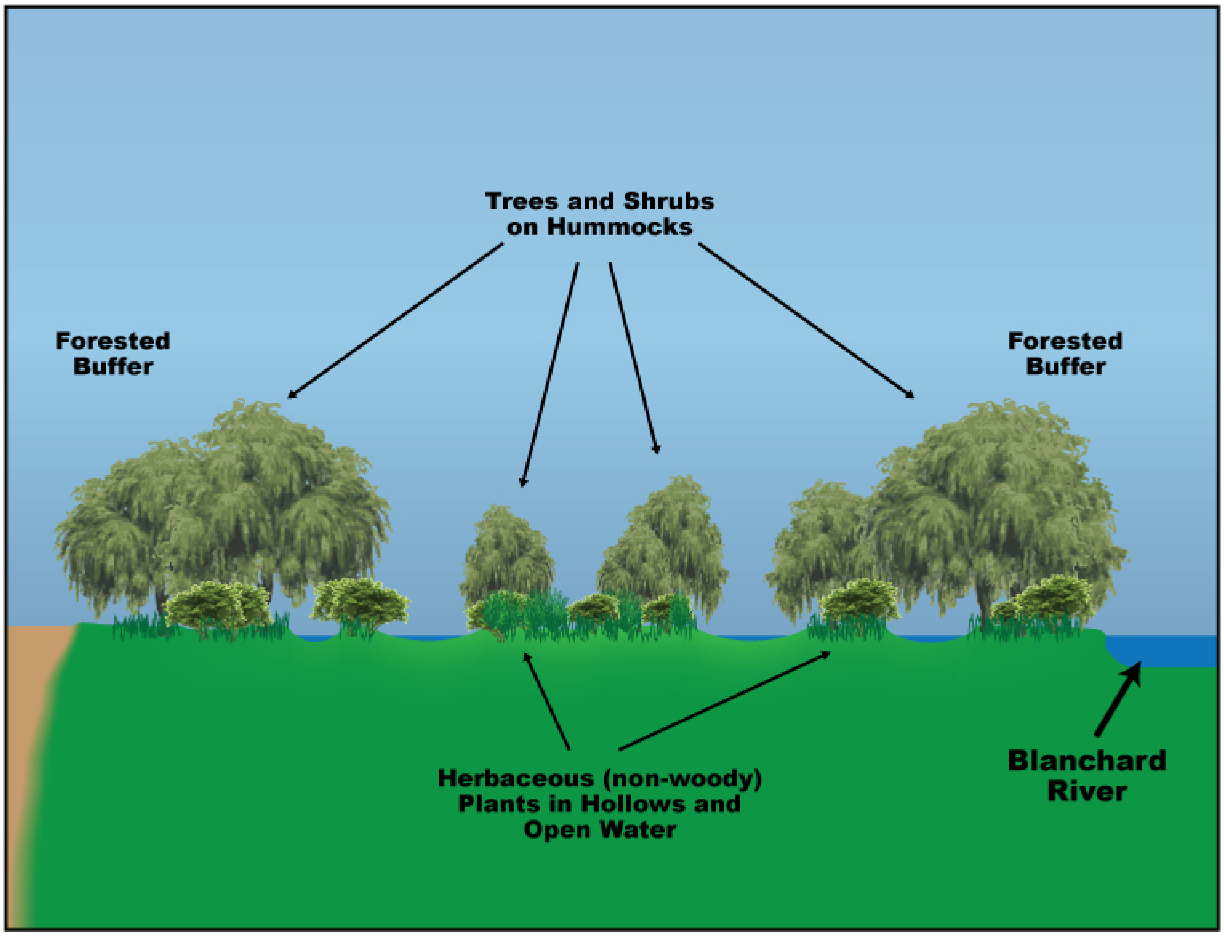

Figure 2.38: Cross section of proposed conceptual wetland mitigation

The Corps is proposing to enhance approximately 9,100 linear feet of highly modified stream channels by adding floodplain benches and forested/scrub-shrub/emergent riparian buffer along approximately 1,500 linear feet of Aurand Run and 7,600 linear feet of Lye Creek. This will improve habitat within the stream and help to connect woodlots to better serve as a riparian corridor for both aquatic and terrestrial fauna. It would also serve to offset the proposed permanent impacts from the recommended plan and result in no net loss of stream habitat within the Blanchard River Watershed. Because of limited site access during the study, however, it is expected that the Mitigation Plan for these stream impacts would not be finalized until sometime after completion of the feasibility study.

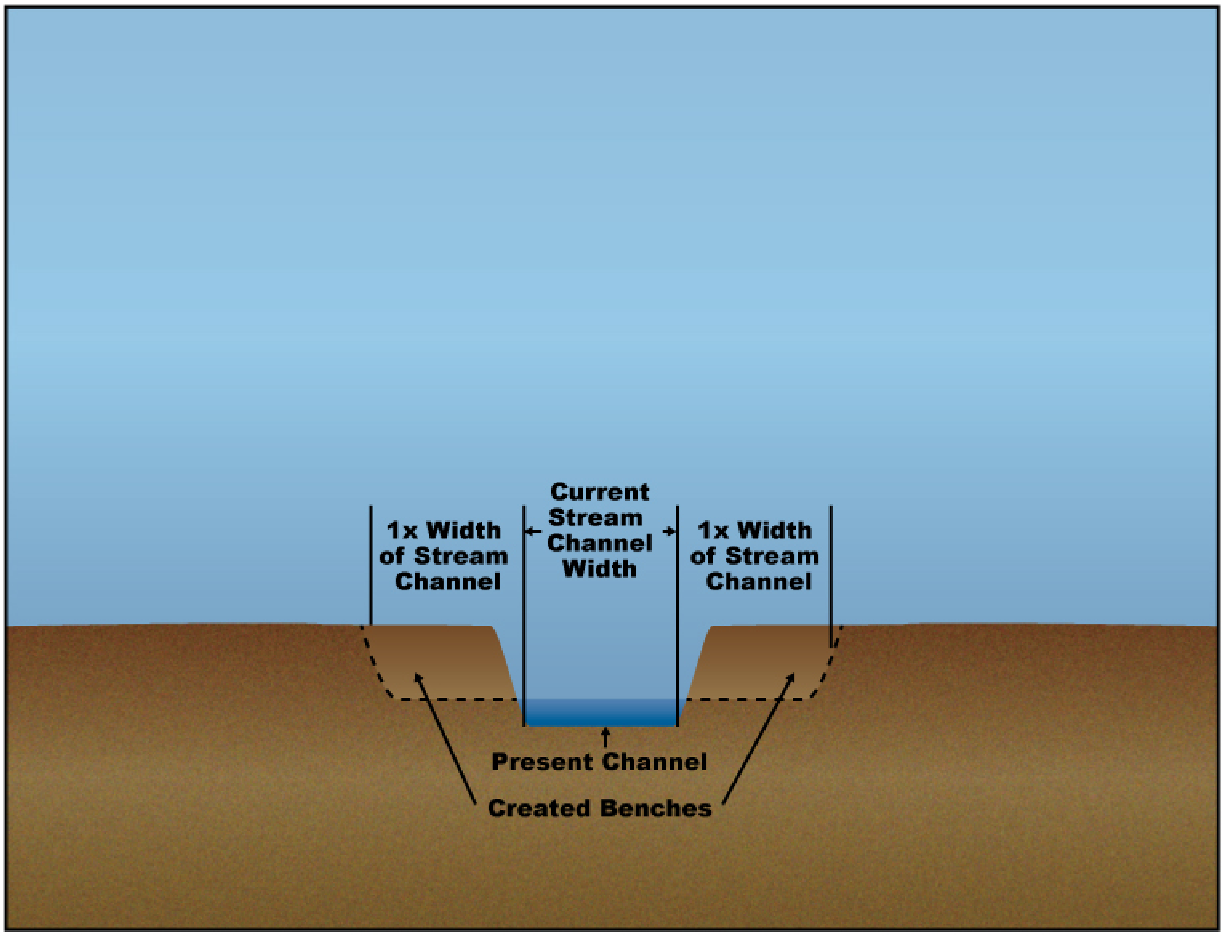

Figure 2.39: Cross Section showing proposed two stage channel restoration

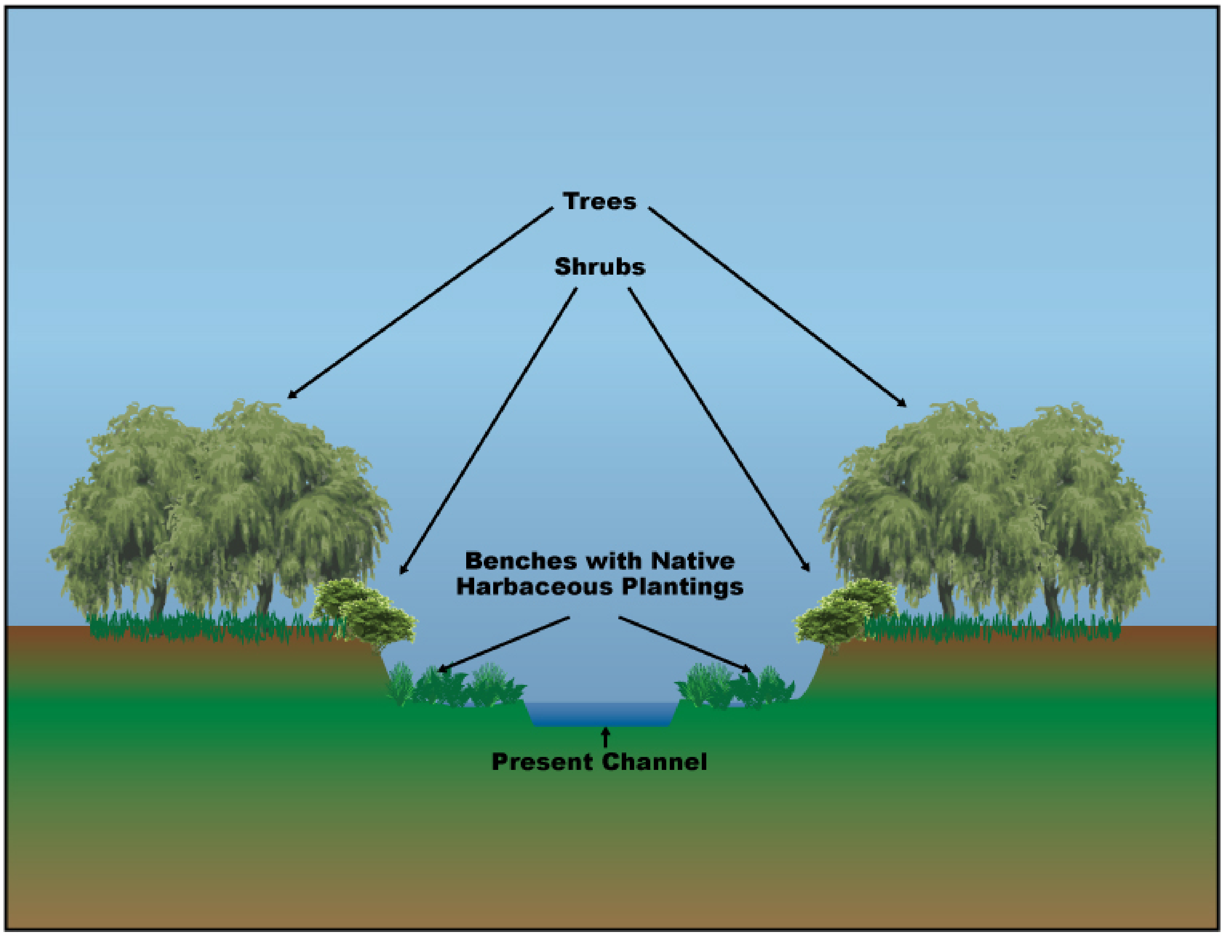

Figure 2.40: Cross Section of Proposed two stage channel restoration with planting and forested/scrub shrub buffer

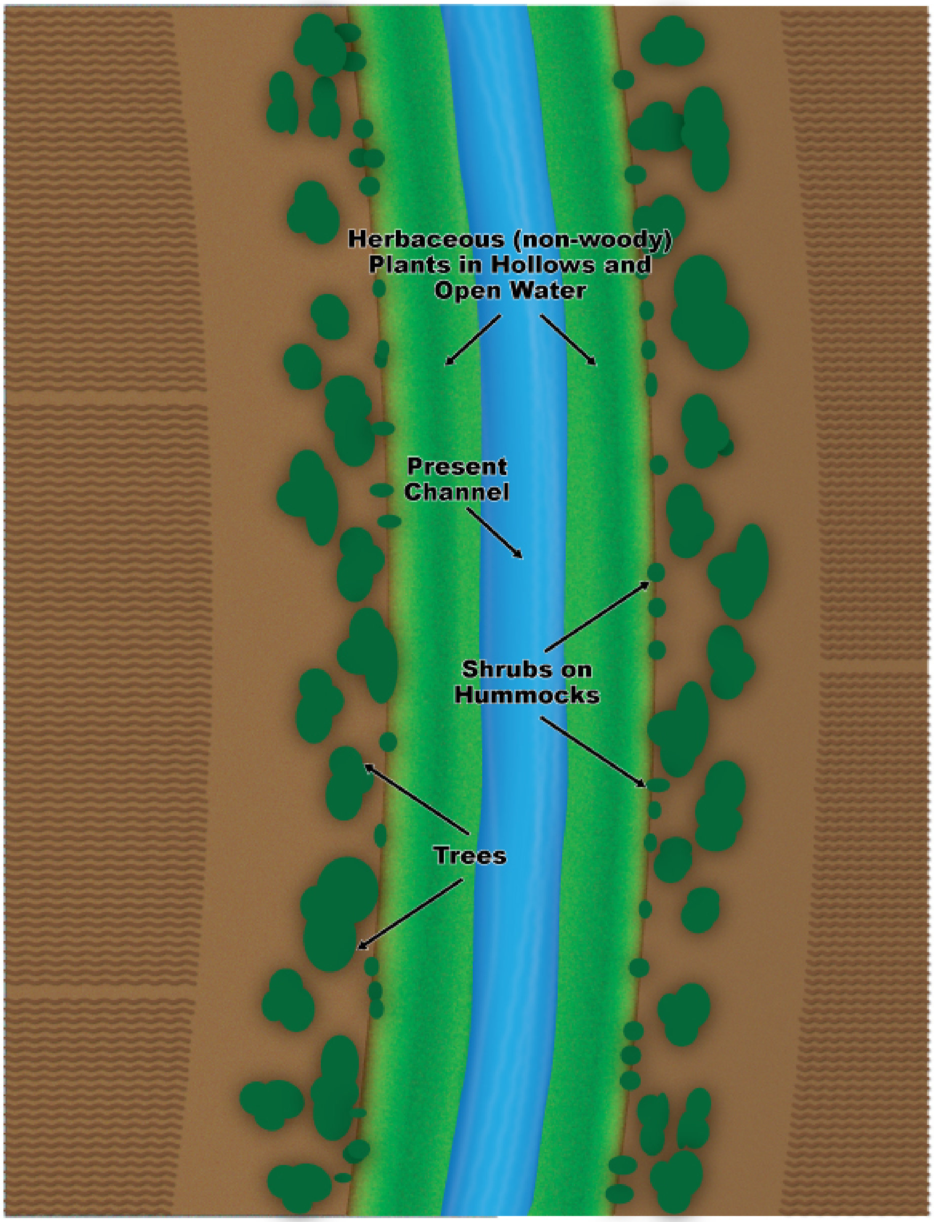

Figure 2.41: Plan View of proposed two stage channel restoration with forested/scrub-shrub buffer.

3.0 Monitoring

The monitoring period that is being proposed for the wetland mitigation project is 10 years due to the proposed creation/restoration of forested/scrub-shrub wetlands with emergent vernal pool areas. Forested wetland areas generally take longer to achieve reference levels.

3.1 Performance Criteria

3.1.1 Wetlands

As part of finalizing this MMP, the USACE will use the "Guidelines for Wetland Mitigation Banking in Ohio" to develop habitat restoration planting plans, success criteria, and monitoring protocols.

3.1.2 Streams

Further coordination with USFWS, ODNR, and OEPA will be performed to develop appropriate success criteria. As mentioned above, QHEI is one of the metrics that is currently proposed to be used, however, goals cannot be set at this time due to lack of access and ability to perform site visits to obtain site specific information to quantify current conditions.

4.0 Adaptive Management

Adaptive management is an approach during project monitoring to allow for the quick identification and management of unforeseen problems in a project being able to achieve its intended purpose (e.g., weather conditions, vegetative die-off). It can also be defined as an iterative approach to managing ecosystems, where the methods of achieving the desired objectives are unknown or uncertain (Holling 1978; Walters 1986). In essence, adaptive management provides a formalized process for the management of an ecosystem restoration project. Such a process is useful for the following reasons:

- Mistakes may be made during construction of the restoration project. Someone will need to determine if the mistakes need to be corrected, whether they are acceptable, or whether they enhance the site.
- Unexpected detrimental events may alter the site, requiring consideration of corrective measures. For example, invasion of an exotic species may necessitate early and/or continued intervention. A decision will be required on how to control this invasion.
- Experiments or trials using different methods may be needed to clarify techniques on how to achieve one or more restoration measures. Decisions will be required on how to meet the performance standards set forth, or if the performance standards should be altered.

Monitoring in an adaptive management context focuses on early identification of undesirable trends and provides the guidance necessary to determine the appropriate remedial action to reverse an undesirable situation or trend. Adaptive management actions would entail either control of unwanted plant species and/or replanting more native species or modification of other habitat features to ensure appropriate habitat types are present. Details will be developed after site visits are able to be performed and site specific information obtained.

5.0 Long Term Management (Post Monitoring)

5.1 Ownership

The areas identified for wetland mitigation are a mixture of privately owned lands and public lands. These are areas adjacent to the proposed Blanchard to Lye Cutoff Levee. The stream mitigation areas are currently privately owned lands that would need to be acquired. The Local Sponsor will be required to obtain the appropriate lands for conducting the mitigation and maintaining these areas in perpetuity as well as the appropriate easements for access and maintenance during the monitoring period.

5.2 Management Approach

5.3 Legal Protection

USFWS and USEPA recommended placing a third party held conservation easement or environmental covenant in perpetuity on both the wetland and stream mitigation areas. USACE will contact potential third party conservation groups to determine level of interest and make a final determination after site visits are able to be conducted to further refine the impacts of the project and proposed compensatory mitigation plan.

6.0 References

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